# THE BUILDER

INCORPORATING

"ARCHITECTURE" AND "THE BRITISH ARCHITECT"

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## THE FUTURE OF OUR CITIES

OUR ideas as to the shape that a great city should take are varied and complex, built up from historic traditions and from the functions it has to fulfil. Both these factors are influenced by the national, occupational and temperamental qualifications of those forming the body of citizens, at least of that proportion of them who have made some, often unconscious, effort to formulate a picture of the pattern that the city as a consistent whole should present.

Apart from the vaguer promptings that have been offered in the form of some type of social Utopia, it will probably be agreed that the most definite influence on popular imagination is found in existing cities of such importance as to strike the observer for one or more of the outstanding qualities they possess. It would be unwise to accredit much to those periods which are familiar only to the archæologist, but there remain many towns with which the average man is familiar, even if only in illustrations, that he has before him a wide range of choice in regard to the characteristics which may appeal to him.

In order not to extend our programme too widely, it would be as well to limit it to cities within the temperate climatic zone and to those which are known in a state materially intact. Another limitation would exclude those of a type where the natural conformation of the site has dominated the urban picture to an extent that renders this impossible of repetition elsewhere, such, for example, as old Edinburgh, Venice or Granada, for it would be unlikely that similar conditions would suggest any repetition of the character resulting from their sites.

For a long time the Renaissance interpretation of the Graeco-Roman plans held the field, as may be seen at Bath, and developments in other cities at home and abroad; then this was qualified by the Landscape School, and later on Camillo Sitte urged the claims of the "accidental" beauty of mediæval planning, thus influencing the design of our garden cities and suburbs. In the main, however, the formal treatment was preferred for all important city centres, and this still dominates design as being more consistent with buildings of the type required in such positions. As the city stretches outward the demand for formality is regarded as being less essential and appropriate, so that the pattern can merge into the normal rural informality.

These variations are part of the town planners' standard technique and the difference between good and bad planning consists largely, apart from practical and economic considerations, in the development of sites in relation to their position as part of a whole and their conformation as regards levels and aspect. When the question is one involving a comprehensive remodelling and reconstruction of an existing city, of course the character of what is preserved influences the type of planning to be employed.

The numerous illustrated articles that have appeared recently in our columns give a fair impression of the degree of success that has been attained in the re-planning of a number of our cities, and most of these show a very definite respect for their main traditions and characteristics, while displaying a general tendency towards dignity and order. It is to be hoped that conditions will enable all the best features of these plans to come into being in due course, and that this will raise the general standard of civic design so that the unhappy legacies of the nineteenth century will no longer be tolerable, and we shall be able to look forward to a time when the mass of the people, having had their material and social requirements adequately met, will expect something more in regard to the architectural impressiveness of their city as a whole.

To achieve this a good plan is, of course, the first step, though this alone would not suffice; it must be accompanied by fine buildings not merely well-designed in themselves, but harmonising both with each other and with what it has been found possible to retain from the past. As an illustration of what should be avoided from this point of view, reference can be made to Vienna, where the planning of the Ring Strasse has for long been an example exercising a strong and well-deserved influence on the remodelling of cities. Here we find in the most important section of the scheme three important buildings which differ so markedly in stylistic treatment that this, though it may have been dictated by symbolic considerations, has resulted in discord where harmony was essential. The group consists of the Parliament House, a Greek design, the Town Hall a Gothic building, and the University in the Renaissance manner, thus giving the impression of specimen designs without the unity that their relative position demands.

Fortunately, the tendency of the present day is to eliminate features derived from the historic styles, making it easier to avoid such clashes in design; and though this deprives us of many treatments recognised as beautiful, it does carry the art of architecture a step forward in affording an easier path towards unity in the character of new developments as a whole. The danger of a dull rigidity confronts us, but it is to be hoped that the future may hold in store some mode of artistic expression which will bring life to the civic designs in the time to come, and make them a worthy record of the "post-war" era.

# NOTES AND NEWS

### The "Plan for London" Film.

"PROUD CITY" is the title of a film which has been made for the Ministry of Information to popularise the L.C.C.'s great "Plan for London." It fully justifies its title. Many Londoners who see the film will realise the extraordinary beauty of their city for the first time. Some of the sunlit panoramic shots, particularly those looking eastward to St. Paul's, with the towers and spires of Westminster in the foreground, have an almost ethereal loveliness. But it is not all beauty; we are shown much of London's squalor, the chaotic tangle of industry, slumdom and railway viaducts. The redevelopment proposals are shown by means of plans and models, with commentary on the various aspects by Sir Patrick Abercrombie, Mr. J. H. Forshaw and Mr. A. C. Ling, and a final summing up by Lord Latham, Leader of the London County Council. The whole thing is clearly and convincingly done. The talk is without notes, but no one hesitates for a word. Incidentally, Sir Patrick makes effective by-play with the polishing and nice adjustment of the famous monocle. All concerned are to be congratulated on the production of a first-rate film which holds the interest for every one of its twenty-six minutes. It is now being shown at the Academy Cinema, Oxford Street, W.

### Chief Architect, M.o.H.

MR. J. H. FORSHAW, Architect to the L.C.C. and superintending architect of Metropolitan Buildings since 1941, is to be chief architect and housing consultant to the Ministry of Health as from January 1.

### House of Commons Rebuilding.

THE Ministry of Works will shortly invite tenders for the foundation work of the new Chamber for the House of Commons from a limited list of selected firms, to be followed later by invitations to tender for the superstructure contract.

In making the selection, preference will be given to firms capable of undertaking the whole work if their tenders for both contracts are successful. The total value of the work involved, including sub-contracts, is about £1,000,000.

It is intended to start the foundation work in December, 1945. Firms wishing to be considered for invitation to tender for these contracts should apply in writing on or before November 24, 1945, to the Director of Contracts (Con. 2), Ministry of Works, Abell House, John Islip-street, S.W.1, giving particulars of their experience of comparable works and of their available plant, key men, etc. The possession of facilities for working stone within reasonable distance of London is desirable.

### Atom City.

NOT many months ago a well-known American orchestra leader cancelled an engagement to appear at Oak Ridge because "nobody's ever heard of that little Tennessee town." To-day, Oak Ridge has hit the imagination of the world as a place where atomic power was developed. In November, 1942, Oak Ridge did not exist even as a name; to-day it is the fifth largest city in Tennessee, with a population of 75,000, housed in nearly 10,000 family units, 13,000 dormitory units, 5,000 trailers, and 16,000 hutments as barracks.

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"PROUD CITY." Mr. J. H. Forshaw, M.C., F.R.I.B.A. (seated) and Sir Patrick Abercrombie in a scene from the L.C.C. Planning Film, noticed on this page

The town, laid out by Messrs. Skidmore, Owings and Merrill, is illustrated in the October issue of the *Architectural Forum*. Communal buildings have grown up with the houses and churches and cafeterias, laundries, a hospital, cinemas, shopping centres, recreation halls, clinics and schools, are provided, much of the construction being in timber, very reminiscent in its inventiveness of the Empire Exhibition in Glasgow. The city is powered by electricity from the T.V.A. The town is planned away from the three huge manufacturing plants which give it its reason for being. Most of the buildings are largely prefabricated. The construction was carried out under the direction of the Manhattan Engineer District.

### Central Housing Advisory Committee.

THE Minister of Health, Mr. Aneurin Bevan, has made three new appointments to his Central Housing Advisory Committee. They are: Mr. C. W. Gibson, M.P., Chairman of the Housing Committee of the London County Council; Miss Jennie Lee, M.P., and Miss Emily Murray, Housing Manager to the Westminster Housing Trust. The appointment of Miss Lee and Miss Murray brings the number of women members of the Committee up to seven. The three new members take the places of Mr. L. Silkin, M.P., the Minister of Town and Country Planning; Ald. Charles Key, M.P., Parliamentary Secretary to the Ministry of Health (both of whom resigned on receiving their Government appointments), and Lord Balfour of Burleigh. Lord Balfour, to his great regret, had to resign owing to the pressure of other work.

### A.A. Assistant Secretary.

THE Council has appointed Mr. George R. Wiltshire as Assistant Secretary to the Architectural Association. Mr. Wiltshire joined the A.A. staff in 1926. He was a member of the 88th (City of London) H.A.A. Regt., R.A., T.A., before the war, and served with that regiment until the end of the North African campaign. He recently returned home after four and a half years' service overseas, which included two years with the Eighth Army in the Western Desert.

### Professional Text-Books.

THE R.I.B.A. Council has set up a Committee to improve both the character and supply of professional text-books and reference books. At present, it is stated, the writing of text-books is something of a gamble for both author and publisher, while there is no assurance that books which are much needed will get written. The task of the Committee is to study both supply and demand and try to correlate them. The terms of reference of the Committee on Professional Text and Reference Books are:—

(1) To consult with educational authorities and other bodies as to the general need for text and reference books; (2) To decide what books are needed after consideration of future books which the Ministry of Works are proposing to publish; (3) To suggest methods for the promotion of authorship and to make recommendations for suitable authors; (4) To make contacts with publishers for the production of books through the ordinary commercial channels.

### Derbyshire County Architect.

MR. FREDERICK HAMER CROSSLEY, A.R.I.B.A., chief architect to the L.N.E.R., has been appointed chief architect to Derbyshire County Council in succession to Mr. John Harrison, who is

taking up a similar post with Surrey County Council.

**West Sussex County Architect.**

WEST SUSSEX C.C. invite applications from Fellow or Associate Members of the R.I.B.A. for post of County Architect. Salary, £1,400 per annum, rising to £1,700, plus bonus, travelling and subsistence allowances. Appointment may be made at higher commencing salary should qualifications, etc., justify it. Details advertised elsewhere in this issue.

**Southampton City Architect.**

MR. DENIS WINSTON, A.R.I.B.A., chief architect for the past three years to the Ulster Government, has resigned on being appointed City Architect for Southampton.

**Professional Announcements.**

MR. FRANK SCARLETT, B.A., F.R.I.B.A., chartered architect, has been released from the Services and is now practising at 11, Upper Grosvenor-street, London, W.1. (Tel. : Mayfair 0287).

MR. CYRIL SWEETT, F.S.I., who closed his practice at the beginning of the war, is restarting in practice as a chartered quantity surveyor at 15, Robert Adam-street, London, W.1.

LIEUTENANT-COMMANDER L. H. KEMP, A.R.I.B.A., R.N.V.R., has now been released from the Fleet Air Arm, and expects to resume his practice at 10, Great James-street, Bedford-row, London, W.C.1, early in December.

## From *The Builder* of 1845.

*Saturday, November 15.*

THE IDENTIFICATION OF ARCHITECTS. That architects should affix their names to their productions as other artists, at least sculptors and engravers, do, would seem to be only reasonable and proper. . . . It is not, indeed, to be recommended that architects should display their names on the fronts of buildings as conspicuously as "Barclay and Perkins" meet our eyes upon many *public* structures . . . but a name and date may be recorded much more modestly. . . . Basevi did so in Belgrave Square, where his name may be read on a plinth next one of the porches to the houses.

## COMING EVENTS

**Friday, November 16.**

HOUSING CENTRE. One-day Conference on "Conversion and Reconditioning." Speakers: Mrs. M. Gee, Messrs. John Wenlock, Harold Bedale and Walter H. Godfrey, 13, Suffolk-street, S.W.1. 10 a.m.

**Tuesday, November 20.**

HOUSE-BUILDING INDUSTRIES STANDING COMMITTEE. Exhibition of Permanent House Plans and Models. Gas Showrooms, Oxford (till November 30).

INSTITUTION OF CIVIL ENGINEERS. Sir E. Owen Williams on "Wind Effects, *not* Pressures." Great George-street, S.W.1. 5.30 p.m.

**Wednesday, November 21.**

R.S.A. Mr. H. Berry on "The Thames Conservancy." John Adam-street, W.C.2. 1.45 p.m. (sandwich lunch, 1 p.m.).

CHARTERED SURVEYORS' INSTITUTION. Mr. M. Rowe (Dep. Sec., W.D.C.) on "Cost of Works Payments for War Damage." Great George-street, S.W.1. 5.30 p.m.

INSTITUTION OF SANITARY ENGINEERS. Messrs. R. Glossop and H. Q. Golder on "Methods of Excavation in Difficult Ground." Caxton Hall, S.W.1. 6 p.m. (tea, 5.30 p.m.).

**Thursday, November 22.**

TOWN AND COUNTRY PLANNING ASSOCIATION. Mr. Basil Langton on "Theatres Need Towns." 28, King-street, W.C.2. 1.15 p.m. (buffet lunch, 12.45 p.m.).

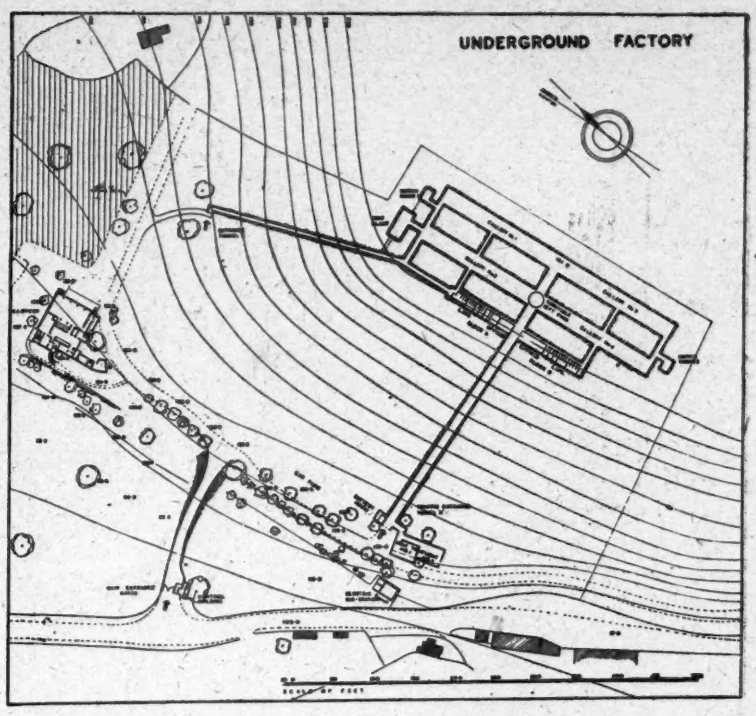
**Friday, November 23.**

INSTITUTION OF MECHANICAL ENGINEERS. Miss V. Holmes on "The Place of Women in Post-War Engineering." Storey's-gate, S.W.1. 5.30 p.m.

A.B.T. Mr. Claude Sisley on "Wood Preservation and Treatment of Dry Rot." Caxton Hall, S.W.1. 6.30 p.m.

**Saturday, November 24.**

INSTITUTE OF QUANTITY SURVEYORS. East Anglian Branch Meeting. Lamb Inn, Norwich. 3 p.m.




LAYOUT AND PLAN OF FACTORY.

# CONSTRUCTION OF AN UNDERGROUND FACTORY

## MR. HOWARD V. LOBB'S PAPER TO R.I.B.A.

A PAPER on the above subject was given to the Architectural Science Board of the R.I.B.A. by MR. HOWARD V. LOBB, F.R.I.B.A., on Wednesday, November 7, at a joint meeting with the Institute of Structural Engineers.

Clients of mine [said MR. LOBB] manufacturing components which were in short supply in the early days of the war, were asked by the Ministry to remove their factory from the London district to a garage, or similar unprotected building in the country.

It was felt that the possibility of moving from a London factory which was well constructed to a garage in the country was possibly going from the frying-pan into the fire, and, following discussions with me, a scheme was developed for tunnelling into a chalk hillside to make a reasonably bomb-proof factory. Tunnelling is probably one of the oldest branches of engineering. . . . As is now known, the Germans developed this type of factory to quite a large extent and quite a number of their essential industries were able to carry on in spite of intensive bombing. The particular interest attached to this scheme is that I think it is the only factory in this country which has been constructed completely—other underground factories having been converted from extensive excavations, caves, quarries, or the like. Throughout the progress of the work, I was fortunate in having the help and advice of Dr. R. C. B. Jones, M.C., D.Sc., F.G.S., M.I.M.E., late of the Geological Survey, and I have pleasure in acknowledging his uncanny sense of walking over the outside of a hill and knowing what is several hundred feet below the surface.

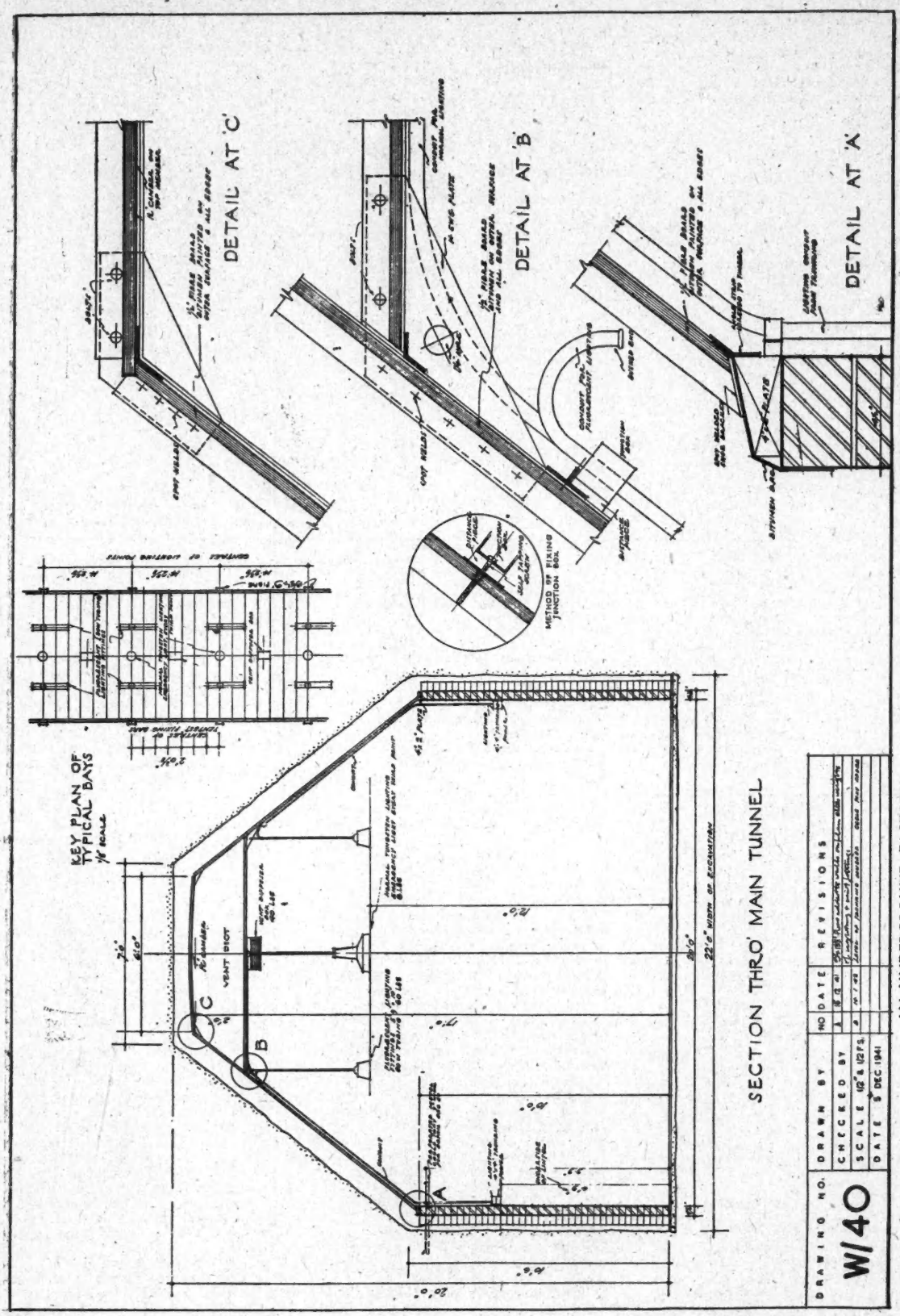
The site consists of a thickly wooded hill face on the main chalk escarpment with a subordinate valley cutting through the northern part of the escarpment and lying roughly at right angles to the main face. The slopes are about 1 in 3, while cover over the chambers is approximately 150 ft. Very little soft or loose ground was found overlying the chalk, and the joints in the chalk were parallel to the length of the chamber. The geological description of the site would be the lower part of the upper chalk, consisting of tough chalk in beds varying from 1 ft. to 2 ft. 6 in. in thickness, with layers of flints along some of the bedding planes. The dip is very slight and into the face of the hillside.

The plan of the factory shows the general layout. Traffic entrance tunnel "A" is 15 ft. wide by 14 ft. high and is provided with an 18 ft. turntable to take five tons at the intersection with the first main galleries. Office blocks, lavatories, first aid rooms, etc., are in Blocks A and B. The general layout was planned to allow reasonable circulation during the construction with several working faces for excavation.

The electrical switchgear rooms are at each end of the main galleries, with the ventilation plant at the north end of the gallery and connectioned by a short tunnel to the entrance tunnel B, which serves as a fresh-air inlet.

It will be seen that the two entrances are 250 yards apart and there is 40 ft. difference in level, which allows tunnel B to be at an angle of 1-6. This allowed a most useful area of waste land to be filled with excavated material and for the trucks used to convey this to be worked mainly by gravity.

The heat-treatment rooms, canteen, substation and sewerage disposal plant, personnel control building, etc., are all external buildings positioned so as to avoid cutting down any trees, and in fact the




AN UNDERGROUND FACTORY: SECTION THROUGH MAIN TUNNEL AND CONSTRUCTIONAL DETAILS.

whole work was completed with the loss of one tree only.

The method of excavation was by the construction of pilot tunnels starting at both ends, using pneumatic picks supplied with compressed air by a 75-horse-power electric-driven compressor positioned near the entrance of the main traffic tunnel. As to the method of excavating, the pilot tunnel is about 10 ft. high by 6 ft. wide, and the henching is carried forward six feet or so and is later removed, being loaded into skip wagons by an interesting small American tool known as the Eimco Findlay loader. This was attached to a wagon rather like a small engine with the mechanical excavator bucket as a cow-catcher. It is certainly a useful tool and could find a place in many building jobs.

When the pilot tunnels were joined up, sections were opened up to the full excavation size and a pilot tunnel at high level constructed; the waste material was tipped through holes into the bottom pilot and was cleared away with the Eimco Findlay loader referred to. The top pilot was widened at the base and the top of the excavation shaped, and later the lower half removed. The opencast excavation to traffic tunnel A was widened, and obviously, being in the "small chalk" with many root growths, was not self-supporting; load-supporting brick walls with rolled steel joists and precast and *in situ* concrete slabs were used over this area.

The construction of the brick walls was in most cases purely as a facing, the air space between these and the face of the excavation being to reduce to some extent the transfer of heat to the excavation. The light steel frames and fibre-board lining was for the same purpose, the top 2 ft. being used as a ventilation duct.

It is obvious that in an excavation of this size some geological faults must be expected, and for a section of the galleries rolled steel joists at 3-ft. centres, tied together with angles and with precast concrete slabs between the webs, were used as a lining to prevent spalling of pieces of chalk.

The rest temperature of the excavation only varied by 2 deg. summer and winter, and in consequence this greatly helped the introduction of ventilation which was purely necessary to secure air change. The ventilating plant consists of an electric pre-heater, air washer, electric secondary heater, centrifugal fan with duplicate electric motors and complete with distributing ductwork.

Fresh air is drawn into the plant through tunnel B, where it is first warmed by the pre-heater battery to enable the air under certain conditions to pick up the necessary humidity in its passage through the air washer to enable comfortable working conditions to be obtained. It then passes through the secondary heater battery, which raises the temperature of the air to carefully controlled limits. Thermostats are provided externally and in the main discharge duct in the plant chamber and in two positions in the main galleries. Seven air changes per hour were allowed, and the plant was tested by placing smoke bombs in the fresh-air inlet and by checking the distribution over the various sections of the factory.

In midsummer the air being drawn through the unlined tunnel B was reduced in temperature somewhat, so that at no time did the factory temperature exceed 68 degrees.

The distribution of electricity throughout the factory was considered in some detail, since it was necessary for the manu-

A GALLERY UNDER EXCAVATION.

COMPLETED GALLERY.

ENTRANCE A, SHOWING HEAT TREATMENT ROOMS AT RIGHT.

facturing processes to have three-phase A.C. single-phase and low voltage supply; and by reason of the machines installed, the lighting had to be considered in relation to the stroboscopic effect created with variable speed machinery and fluorescent lamps. This was achieved by reason of the introduction of alternate tungsten and fluorescent lamps, which successfully overcame the problem. The electric supply to the machines was by means of ducts on the wall about 6 in. square separated with sheets of asbestos with 12-way fuse-boards in various points in the length of the galleries, enabling the utmost flexibility in the placing of machines. Travelling cranes of three tons capacity were provided in some galleries.

One interesting point which this factory set out to achieve was attained, that an undertaking of this type could be carried out at approximately the cost of a surface factory, taking into account the expense which would have been necessary with the provision of black-out, camouflage, air-raid shelters, etc., in this latter undertaking.

Even more important was the saving in building trade labour, which at the time this factory was constructed (1941) was a vital consideration, the comparative man-hour figures for a surface and an underground factory being one-third less labour with approximately two-thirds of the steel and timber requirements of a surface building of similar floor area. In the case of the underground factory, a continuous system of three eight-hourly shifts a day during construction is practicable, and taking this into account, the time for completion of this project is approximately the same as a surface building.

There are some people, including associates of my own profession, who feel that industry with a possible war potential should seriously consider its position and that further factories of this kind should be provided. This is obviously outside the scope of my talk this evening, but this factory shows, I think, that satisfactory conditions can be created, giving protection against the present-known forces of destruction.

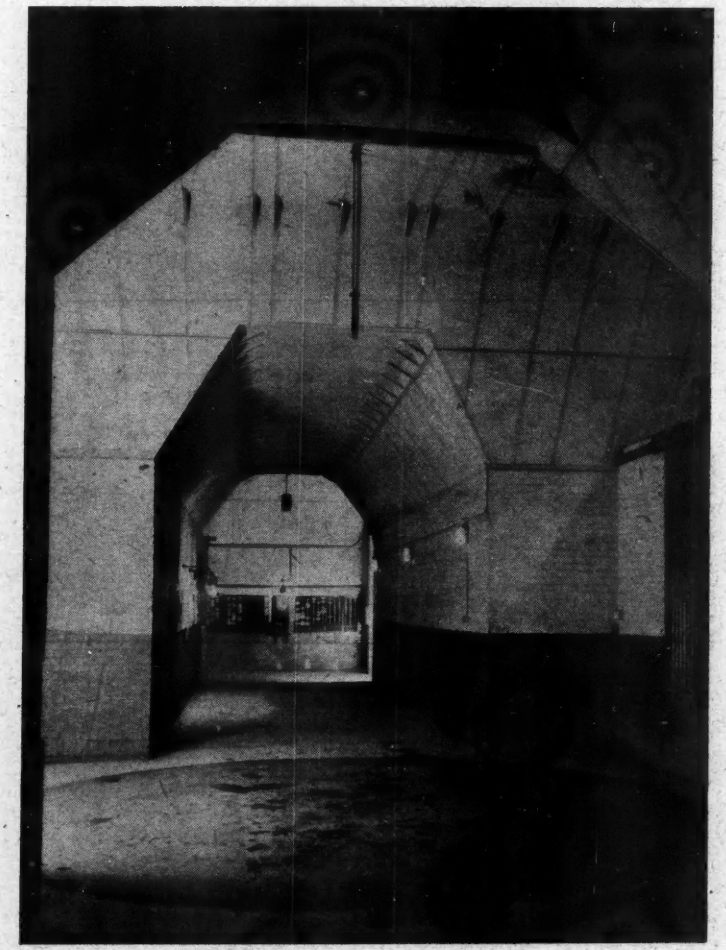
## OBITUARY

### V. H. John, L.R.I.B.A.

We regret to record the death of Mr. Victor Hugh John, L.R.I.B.A., at the age of 57. For the last 15 years Mr. John had been on the staff of the Gloucester County Architect.

### Horace Pitcher.

We regret to record the death of Mr. Horace Pitcher, director of Pitchers, Ltd., building contractors, at the age of 55. He entered the firm about 1910, and during the 1914-18 war was an officer in the Royal Engineers, whilst in the recent war he was a captain in the R.E.s. Mr. Pitcher was a Past-Commodore of the Royal Burnham Yacht Club and was well known as a racing helmsman. His ashes have been scattered at sea.



UNDERGROUND FACTORY: TURNTABLE BETWEEN GALLERIES 2 & 4.

## THE STORY OF BRISTOL

APPARENTLY in emulation of the publications issued by the Bournville Trust, Messrs. J. S. Fry and Sons have initiated the preparation of a well-illustrated historical and social study of the City of Bristol.* To present this in an attractive and popular form has been a comparatively easy task, as Bristol, next to London, takes the most interesting and important place in the earlier development of the life, industry and commerce of our country, lasting through seven centuries, and only outstripped by other important provincial centres towards the end of the eighteenth.

The records of the existence of Bristol start from A.D. 978, when it appears to have occupied a mound of land about thirty acres in extent on the north side of the Avon some eight miles from its mouth. By the time of the Conquest it was a prosperous trading centre and soon after this the great castle was built at the eastern end of the town. The river Frome, a tributary of the Avon, which encircled the town to the north and west, was opened into the castle moat enclosing the area on the east and south, thus completing the defences. Ecclesiastical foundations were established, as was usually the case, outside the city walls, the more important of these being St. Augustine's Abbey (now the Cathedral), Grey Friars to the north and the Dominicans or Black Friars near the Castle.

The old Bristol Bridge across the Avon (probably of wood) was rebuilt in stone about 1248 and to do this the river was diverted across the Temple Meads peninsular on the south, and on the resumption of the main river this area was enclosed by a defensive wall allowing the city to expand nearly as far as the present church of St. Mary Redcliffe. Another increase in the area of the city was provided later by the diversion of the main channel of the Frome westward enclosing "The Marsh" in which Queen Square was subsequently laid out in 1702. As the result of its early activities no English commercial city is richer in mediæval buildings, and though many of these were destroyed or badly damaged during the recent war, they still constitute a valuable inheritance. The Cathedral, expanded from the Abbey Church of St. Augustine, does not rank highly among its compeers, but the perpendicular church of St. Mary Redcliffe is generally recognised as the finest parish church in the kingdom. The numerous other mediæval churches and ancient buildings of artistic value have mostly suffered serious damage in the "blitz" which has devastated large areas in the central part of the city. A fairly comprehensive scheme of reconstruction is visualised, and it will require intensive study to bring what can be saved from the past into harmony with the new plan and modern building developments.

The story of Bristol's commerce and the series of measures to provide harbour facilities in accordance with the demands of successive expansions in the methods and scale of shipping is interesting. Starting with the reach of the Avon below the bridge, the wharves extended up the new channel cut for the Frome where our illustration of the Broad Quay gives a contemporary picture of the Bristol of that day. After 1775 this stream was found too small and was partly covered in, the shipping reverting to the lower reaches of the Avon. Later on, the Avon tides made such a port inconvenient and a new cut to

* English City: The Story of Bristol. University of London Press, Bickley, Kent. Price 10s.

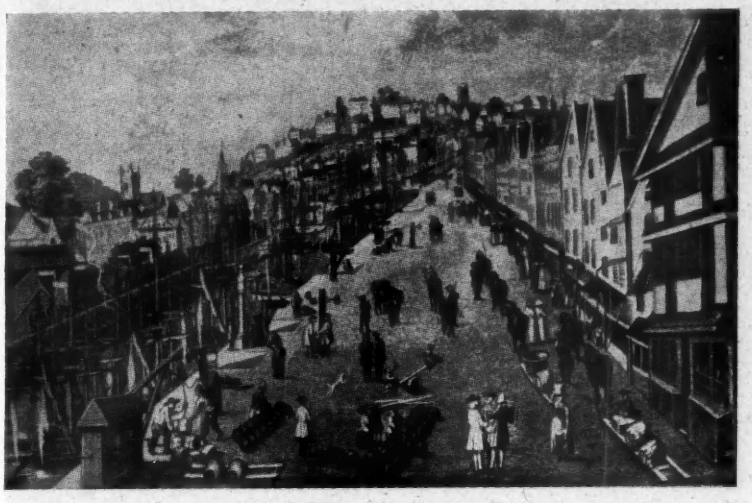


Fig. 1. The River Frome and Broad Quay in the 18th century, from a picture by Peter Monamy.

the south enabled the old river to be converted into a large dock with lock entrances (1809). Subsequently, when ships became too large to negotiate the river, it became necessary to provide new docks at Avonmouth and Portishead.

The abolition of the slave trade affected the sugar imports and commercial activity was on the decline during the early part of the nineteenth century, but the railway connection with London, effected in 1840, helped to restore the position and though Liverpool and Glasgow have drawn off the major portion of the trade with North America, Bristol has made steady progress during the last hundred years and is now an important centre for the import of tobacco, cocoa, bananas and other materials, accommodating large industries connected with these; two new industries, paper-making and aeroplanes, have been started, so that Bristol's imports are now about ten per cent. of the nation's total.

Housing in Bristol displays the same defects as were prevalent in other large cities, but it is also active in the amendment of these, and it is expected that the recent extensive destruction will give great opportunities for remodelling the inner areas of the city. Studies have already been made with a view to this, both officially and by the local architects. We illustrate one of the latter showing a suggested plan for the centre of the city on the area of the Frome valley depicted in the old print of the Broad Quay which is also reproduced. This scheme is somewhat diagrammatic in form and might require modification in detail to carry out the expressed intentions of restoring and preserving all existing buildings possessing historic or artistic interest. In general the main principles of city planning are recognised in the proposals and the co-ordination of the areas allocated to industry, commerce, housing, education and recreation is regarded as essential. H.V.L.

## AN EXHIBITION OF PENCIL DRAWINGS

A SMALL exhibition of pencil drawings by Mr. Myerscough Walker is now open at the Building Centre, Maddox-street, W. The drawings principally represent the trend of urban modernistic architecture. Amongst the most striking may be mentioned the Longfellow building, Washington, D.C., for which the architect is Mr. W. Lescaze; a school in Hertfordshire; and Mr. Maufe's Guildford Cathedral by night. This last is a striking representation. The drawings, and not the architecture represented, are the object of the exhibition. Some sixteen are exhibited, and beneath each are descriptive notes on the paper and degree of pencil, such as B, BB, or HB, used, and method or tricks employed to obtain the effects shown. Following is an extract from beneath the drawing of 23, Lower Belgrave-street: "Sharpen pencil over the dark parts of the drawing with a knife and rub the dust into the paper to create the tones, or use a charcoal stub to create an evenness of tone." According to the notes, the task of making these drawings must have been a tricky one. Most artists are able to obtain great variety of tone value without stubbing and rubbing. Those interested in pencil drawings should make a point of seeing the exhibition.

### Permanent Prefabricated Houses.

The Ministry of Health has issued to local authorities a circular (182/45) in which are brief technical descriptions and diagrammatic drawings of each of the seven types of permanent prefabricated houses approved by the Ministries of Health and Works—the B.I.S.F. (A), Braithwaite, Hill, Howard, Airey, Easiform, and Orlit. The Easiform house is illustrated elsewhere in this issue, and all these houses, with the two exceptions of the Hill and Airey types, have been illustrated in our pages.

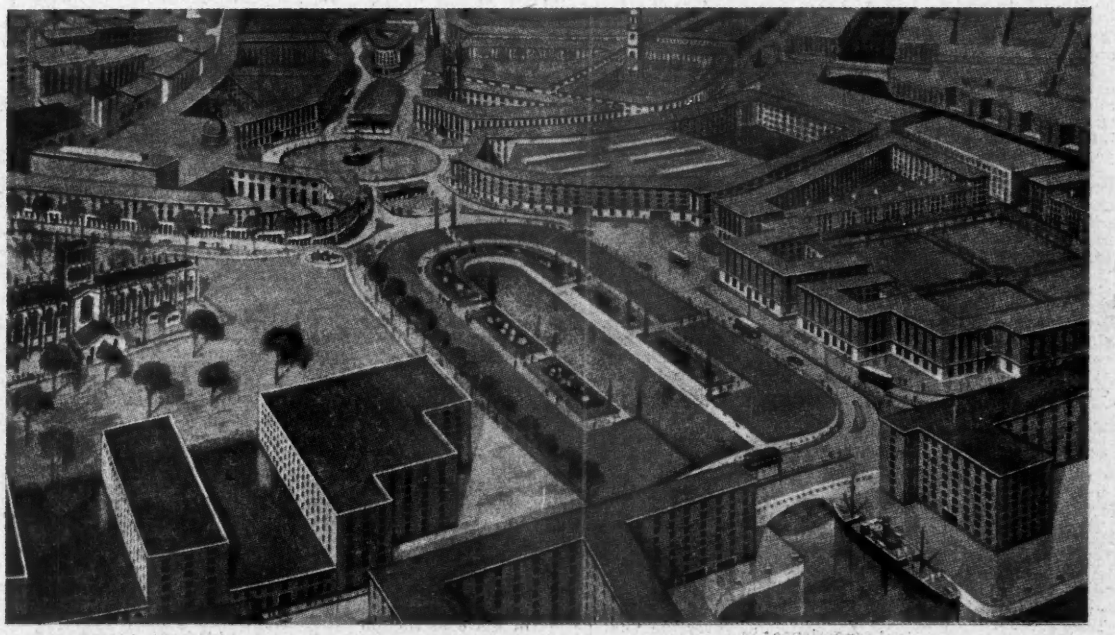


Fig. 2. Proposal for the development of the Frome valley as the City Centre, by the Western Chapter of Architects.

# SCIENCE IN THE CONSTRUCTION OF HOUSES

## LECTURE AT THE ARCHITECTURAL ASSOCIATION.

THE annual general meeting of the Architectural Association was held on Tuesday, October 30, at 36, Bedford-square, W.C.1. The business connected with this having been transacted, there followed an address on "Science in the Construction of Houses," by MR. WILLIAM ALLEN, B.Arch., A.R.I.B.A., spokesman for a team of workers at the Building Research Station. The President, Mr. Graham R. Dawbarn, F.R.I.B.A., was in the chair.

MR. ALLEN said that building research, to be fruitful must be carried on where problems could be seen as a whole, because even simple items of building had to be examined from several angles to get an answer meaning anything in general practice. Thus studies in sound insulation made twenty years ago had given useful pointers on how to improve party walls, but such information could not have much effect upon practice until associated with studies of fire protection (which was the other main function of a party wall), and, moreover, until we had some idea of what standards of sound insulation and fire protection we should aim for. Twenty-five years ago the Building Research Station had been established, the first intention being to study building materials and methods of construction. Since then there had been many extensions to the central idea, with particular trends recently towards the study of human needs in building; but the main effort of research had continued to be upon materials and methods of construction.

### Standards.

Taking up first the question of standards, Mr. Allen said that when orthodox building forms had to be supplemented by alternatives, the first question which arose was—"To what standards are they to be built?" At the end of the last war, when there was also an urgent need for alternative house types, this question could not be answered, and there was every reason to believe that the inability to do so was a principal cause of the unpopularity of some of the last-post-war houses. In fact, many of them had good features, which might have been better appreciated had there not been less satisfactory points giving irritation. Some evidence about the technical performance of alternative house types built in the 1920s was collected by the Station during the interwar period, and during the past three years a more comprehensive and detailed survey was carried out, the results of which were published in the first report of the Burt Committee on House Construction last year. Thus, the critical importance of standards was realised from the outset this time; and as soon as it became possible to divert time from war programmes for the purpose, work was put in hand to draw together the relevant researches, and on that foundation to formulate the standards. In some cases this part of the work was done in association with the Study Committees on Post-War Building, and they formed a valuable link in the chain of development. The circumstances were a little less propitious than could be wished. There would be no point in having standards if these did not represent adequacy, but this must be without avoidable excess. It was not possible to say, "If you go for such and such a figure you will be on the safe side," because we could not now afford waste. But to strike a high target and not overshoot it implied a refined state of knowledge, and it had to be admitted that some of the standards would probably need revision as we acquired experience in trying to reach them, as indeed had been the case. However, this work went on, and early in 1944 it was possible to publish definite standards for (a) strength and stability, (b) thermal insulation, (c) sound insulation, and (d) fire hazard. It was also possible to give close guidance on (1) moisture penetration and condensation, (2) maintenance and durability, and (3) vermin infestation. These were published as a group in Post-War Building Studies No. 1, "House Construction," and a little later standards of natural and artificial lighting were added to the lists by publication in Post-War Building Studies No. 12. There remained yet to come the recommendations for the heating of houses and flats in the same series.

Read together as a group, the scope of the standards was comprehensive and, so far as was known, they formed a more advanced statement of criteria than had previously appeared. Why did the standards differ from orthodox construction? Were the standards of the orthodox house not satisfactory? The answer was that the normal pre-war house was a compromise between what seemed desirable and what was practicable with traditional methods. Thus, because the 11-in. cavity wall had more strength than was necessary but less thermal insulation than was economically justified, it was not a sound idea to use it as a guide. In this and other matters the new standards had been determined independently upon the basis of all the information available, including experience with traditional houses.

Some tables thrown on the screen showed that as regards thermal insulation the value of the 11-in. cavity wall, of the suspended timber floor and of the roof tiled and felted were all low; while that of the solid floor—wood blocks on concrete—was adequate. As regards fire-resistance, the 11-in. cavity wall and the 9-in. brick party wall were both excessive, while the timber joist floor with plaster ceiling was acceptable. As to insulation from airborne sound, within a single pre-war dwelling this was adequate, but between dwellings it was low. In some respects the new standards were unexceptionable. On certain points, such as fire protection, lighting, sound insulation and strength and stability, they represented decided advances in knowledge, and in respect of sound insulation between dwellings the standard itself was believed to be higher than had hitherto been either an aim or a possibility elsewhere. In the last few days he had seen a pamphlet referring to a reduction of 55 decibels as the standard of post-war housing in Russia; but he gathered that the actual reduction was no more than that of a 9-in. brick wall, which we considered as only 50 decibels.

### Methods of Investigation.

Speaking of the methods of investigation employed at the Building Research Station, the lecturer said it was one thing to recommend standards and another thing to attain them on the huge scale now envisaged, and at the Building Research Station a procedure had been introduced for licensing and development which enabled designs to be brought under review. By this procedure the proposer of an alternative method of construction, having put forward his scheme in the form of an application to erect a prototype, the design was considered on technical grounds, weak points were discussed between the research side and the designer, and, if the design was regarded as promising, a licence was granted. When the prototype had been erected it was examined, and was usually subjected to tests on doubtful points, after which a report was forwarded to the Burt Committee. It was important that at an early stage, while the design was still in some degree fluid, the designer and the research side would be brought together, and that they should remain in touch over the vital period of the construction and the study of the prototype.

The lecturer continued, illustrating his remarks by some lantern slides, with explanations of how strength and stability had been studied. The most important point, he said, was that no one could say what proportion of a frame system came from the cladding, the partitions, the stairs, the chimney, and so on. Normally these were neglected, the frame being assumed to take all the load; but they all played a part and could not be neglected without waste. Prototypes had been studied in the field, a new research team being built up for that purpose. Some 30 or 40 houses had been examined, on all of which deflection measurements had been made. Stress studies had also been carried out on some of them—special instruments being designed for this work. In addition to these field studies, special laboratory work had been undertaken at the Building Research Station, a special test bed being prepared to receive complete pairs of houses for further study.

Of the results of these tests in the field and at the Station, the lecturer said it had been observed that the measured stress was always smaller than had been calculated: this indicated that the basis of design was conservative even after allowance had been made for the normal factor of safety. Another observation was that stiffness and deflection were more important than loads. In respect of deflection, a group of what seemed to be reasonable acceptance criteria had been established.

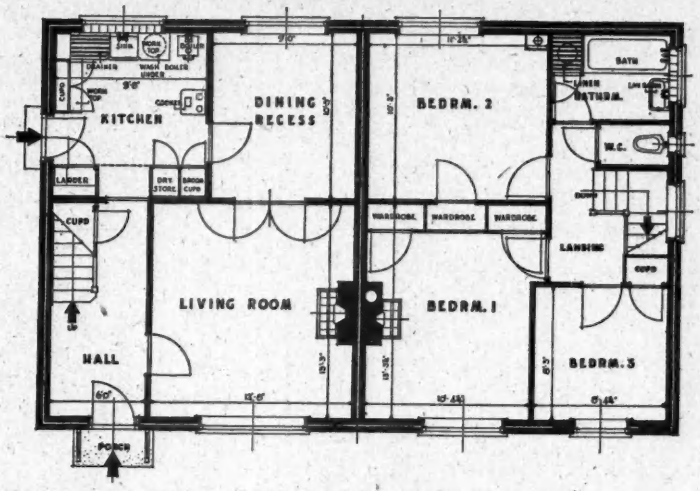
### Sound Insulation.

Of insulation against noise, the lecturer said that field tests on sound transmission were in the hands of the National Physical Laboratory, which was generally responsible with the Station for the general conduct of acoustics research. To-day some 30 measurements on prototypes had been made, and now the evidence existed that a reduction of 55 decibels could be reached without difficulty or exceptional expense. A party wall consisting of two leaves of breeze concrete, each 3 in. thick and cast *in situ*, gave the desired reduction. Such a wall involved no unfamiliar techniques or materials and, if anything, was less expensive than a 9-in. brick wall. Within recent weeks a new thin double-leaf construction, with dry sand in each leaf, had shown itself capable of exceeding the requirement of 55 decibels; and in this case the overall thickness was only 4½ in. To use this method it would be necessary to combine the insulation against noise with protection against fire, and to fix the sand in some way so that it would not run out if a hole was knocked in the wall.

Great advances had been made in fire protection studies; in thermal insulation a great improvement had been made on pre-war practice; in lighting this country had now a leading position, and interesting developments were expected in heating. Practically the whole of the Station's laboratory capacity was now marshalled behind the housing work. The success of the preliminary contacts and subsequent prototypes depended largely on how fluid the design was when it first came under review, the best results being generally obtained when the design was only established in outline. Later on it was often a matter of chance whether some necessary amendment could be made without upsetting other features. In the great majority of cases designers had been exceptionally co-operative, and much credit was due to them for the way they had tried to meet the advanced standards that had been laid down. The work was still developing. Probably the main period of novelty was behind us, some 70 or 80 different proposals for complete house types having been examined; but before us lay a second stage in the programme, when the most promising of the alternatives would pass into pre-production trials in the final form. Beyond that lay a time when the immediate urgency would have passed and even better houses could be built.

# LAING "EASIFORM" PERMANENT HOUSE

D. A. ADAM, L.R.I.B.A., & F. STOBART, A.R.I.B.A., ARCHITECTS




VIEW AND PLAN OF "EASIFORM" HOUSE ERECTED RECENTLY.

THE MINISTER OF HEALTH HAS RECENTLY made several references, in speeches and also in a Circular (182/45), to certain types of permanent houses whose production can be expanded by the use of systems of speedy construction making less demand than traditional methods on site building labour. These houses are of three classes, (a) Wholly prefabricated, of which the only example is the pressed steel house which has yet to be seen; (b) steel-framed; and (c) Concrete. "Mock-up" examples of the houses in classes (b) and (c), all of which have been approved by the Ministry of Health, have been erected in London at the Alexandra Palace, and can be viewed on application to Mr. E. W. Ablett, Room 370C, Caxton House, S.W.1.

The "Easiform" house (approved in category c) is based on a system developed by Messrs. John Laing and Son, Ltd., shortly after the 1914-18 war and used for the erection of large numbers of houses for local authorities and public companies. A view of one of these 20-year-old housing schemes is given on the next page. The current example, shown by photograph and plans on this page, incorporates scientific improvements made in the past 20 years; these include a cavity party wall and insulation at vital points to deal with sound and heat transmission. Standards of concrete aggregate, plumbing, electrical work and prefabrication of joinery work have all had special consideration. Work on actual estates has been commenced.

The house adequately meets the seven structural requirements as laid down in the Burt Committee's Housing Manual. These are: strength and durability; freedom from damp; thermal insulation; sound insulation; resistance to fire; durability and ease of maintenance; and resistance to vermin infestation.

GENERAL CONSTRUCTION.—The basis of construction is in the design and manufacture of the steel shuttering which results in walls that are plumb and finished with a good surface. Easiform shuttering is in convenient 2ft. lifts, can be fixed by unskilled labour and transported without the use of mobile cranes. The Laing system of shuttering has also another advantage in that it allows for reasonable variations in plan to increase the size of standard types. There are three types of Easiform house and provided the contract is sufficiently large, shutters can be prepared for any reasonable design. The external cavity wall (which is reinforced over and under window openings with ⅜ in. mild steel rods) consists of 3½ in. gravel concrete outer leaf, 2 in. cavity and 3½ in. clinker concrete inner leaf. Expansion joints are formed in the shuttering and left in the outer leaf of the external walls opposite the party wall. The party walls and the partitions on the ground floor are formed at the same time as the external walls, so that the whole construction is monolithic. These walls, together with the first floor partitions, are cast in clinker concrete except for the chimney breasts, which are of gravel concrete. This construction shows an improvement in thermal insulation over the traditional house built with 11 in. brick cavity walls.

The comparative values claimed by Messrs. John Laing for the co-efficient of thermal conductivity are as follows: —

| | |
|---|---|
| "Easiform" construction | 0.26 |
| 11-in. cavity brickwork (plaster on inner face) | 0.30-0.33 |
| 9-in. solid brickwork (plaster on inner face) | 0.42 |

"Easiform" construction also is claimed to compare very favourably with brickwork as regards sound insulation and fire resistance.

As for the reinforcement, four rows of ⅜-in. diameter steel rods are placed in both outer and inner leaves of the cavity walling at positions under and over the ground- and first-floor window openings. The reinforcement rods in the inner leaf are returned into the party wall about 3 ft., with cranked ends. Reinforcement to the partitions consists of a single ⅜-in. diameter steel rod placed horizontally above the door in each wall. In all cases the reinforcing rods are surrounded with gravel concrete.

The external finish of the walls as left by the shuttering is accurate, but the appearance is improved by applying a coat of dashing of no appreciable thickness, consisting of pure cement with a mixture of granite chips of about 1/16 in. to 3/16 in. in size. The interior wall finish is carried out by labourers provided with a special V-shaped trough, one edge being fitted with a rubber strip. Plastering material is placed in this trough, which is then wiped up the face of the internal walls and partitions, spreading a layer of plaster which fills in any small interstices and leaves a good surface for either distemper or wallpaper.

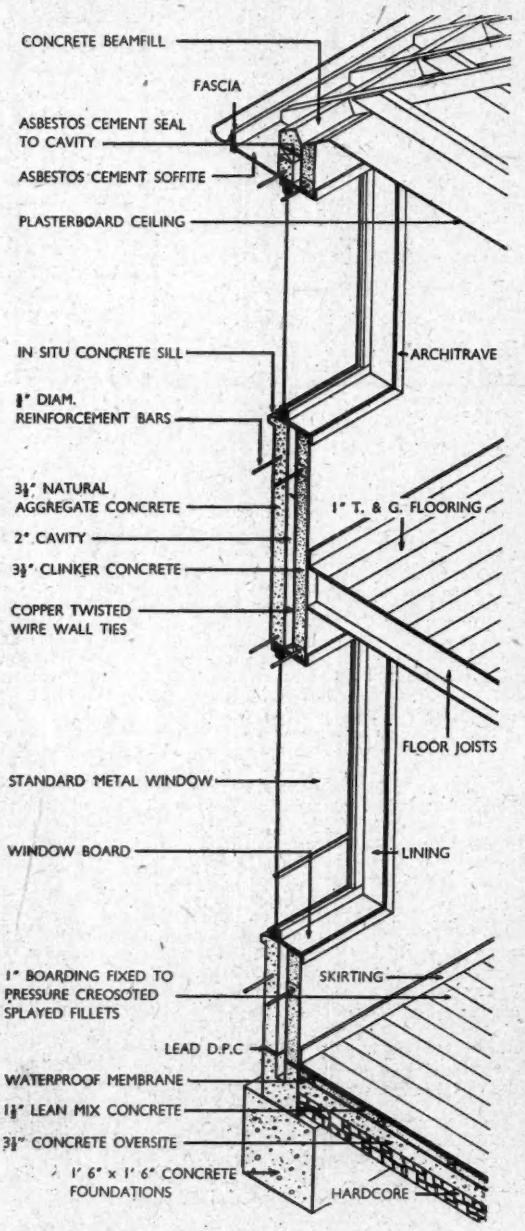
The ground floor is 4-in. concrete on hardcore laid to a true and smooth surface to take wooden blocks laid on bitumen. While timber is scarce, pitch mastic could be used instead of blocks. Other alternatives are the traditional wood floor with air space underneath or the construction shown in the isometric drawing.

The first floor and roof are of usual construction, and the roof tiles are fixed on felt and battens.

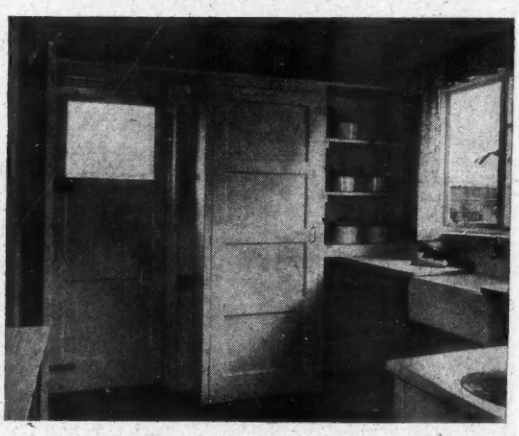
The "Easiform" system allows for considerable variation in elevations so that housing schemes can be laid out to give variety. The aim has been to design houses that will meet the general demand and at the same time be capable of production in large numbers.

SPEED OF ERECTION.—There is practically no limit to the speed of production, so the company claims, since the system lends itself to organisation and a sequence of operations. Each gang has its own particular work throughout the scheme, and in this way both waste of labour and material is reduced to a minimum. The number of houses constructed each week depends on the number of sets of shutters used, each set producing one complete house in a week. The system provides work for all types of willing, unskilled men, and these are very quickly turned into efficient workers.

THE LAING "EASIFORM" PERMANENT HOUSE: A HOUSING SCHEME ON THE "EASIFORM" PLAN ERECTED IN 1926.



VIEW SHOWING SHUTTERING AT GROUND-FLOOR LEVEL.
*Below*: THE KITCHEN.



# INCREASING BUILDING OUTPUT

## CAN A BONUS ON OUTPUT BE INTRODUCED?

**From a Special Correspondent.**

The need to secure maximum output in order to cope efficiently with the great programme of work before the Building Industry has been frequently discussed in general terms within recent months, but few practical suggestions have been made towards securing the desired end. We are glad, therefore, to publish the article which follows. The scheme set forth has been produced by a well-known master builder of wide experience who desires for the moment to remain anonymous, and is, so far as we are aware, the first of its kind to be put forward for the consideration of the Industry. The scheme is not necessarily regarded as perfect, and correspondence upon it, giving criticisms and suggestions, will be welcomed by the author as much as by ourselves. We propose in due course to publish a leading article on this subject.—ED.

WITH a new period of building activity there is a growing demand for quicker building and lower costs. Higher output per man-hour is one of the basic factors in both.

In recent months there have been innumerable references to output in leading articles and in reports of speeches and discussions; there have also been letters on the subject in the columns of the technical Press and elsewhere. But the correspondence has been singularly inconclusive, as if people were afraid of committing themselves. And practically all the letters have come from the employing side of the industry, as if labour were studiously refraining from showing its hand, though labour is vitally concerned in ensuring that output is satisfactory.

But we are not going to get greater output by merely asking for it. We have got to earn it, and somehow or other we have got to earn it without still further raising building costs. What inducement has the employing side of the industry to offer to labour to speed up production, in addition, of course, to seeing that its own production methods are as efficient as up-to-date methods can make them? Other industries have payment by results, bonuses on output, profit-sharing, and the like, and individual firms in the building industry have their own schemes. Can these, or any of them, be adapted to the building industry as a whole? Is there any means by which to overcome the objection which both employers and employees at present have to payment by results? This, I suggest, is an issue which has got to be faced, and the sooner we face it the better for the industry and for the country.

The chief difficulty is to evolve some objective standard by which increased and increasing output can be measured. Is it possible to evolve one? I think it is, and with a view to stimulating discussion on the subject I offer this scheme, which, for convenience of reference, I have called "Operation X," for the consideration of the building industry.

### "Operation X."

The essentials of the scheme are:—

1. To fix the number of man-hours estimated to be required for all operations.

2. To find out the total time taken in completing those operations.

The basis is that the measurement by the quantity surveyor of the work done by the contractor shall be the means of determining the output of the labour employed.

All contracts with bills of quantities forming the basis for payment to the contractor are suitable for inclusion in it, and all work that can be measured can be brought within its scope.

Before the scheme could be put into operation it would be necessary for some authority (such, for example, as the Payment by Results Panel) to compile a complete schedule of man-hour components.

This, at first sight, may appear to be a prodigious, if not an impossible, task. On consideration, of course, one realises that this is not the case, and that in reality assessment is being made by estimators all over the country every day. (In the "build up" of any rate price an amount has to be included for labour; this can be properly described as the man-hour component.)

Take the Ministry of Works Schedule of Prices as an example. Every price contained in it is a "build-up" of labour, materials and overheads and profit (within this last term may be included use and waste of plant), and such a Schedule could be the starting point for discussion within the Committee appointed to fix standards. When the Committee had compiled the man-hour component rate-book it would then be used throughout the industry as the Standard Table of Man-Hour Components, and in every bill of quantities issued there would be the appropriate man-hour component (taken from the Table) against every item. To arrive at the total number of man-hours for the whole job the man-hour component of each item would be multiplied by its appropriate quantity and carried into a total column. The sum of these totals would then be the total man-hours for the whole job.

On the completion of the job the total of wages paid could (if thought desirable) be certified by a chartered accountant, and by comparing this figure of total wages paid with the total estimated man-hours, any saving would be shown. This saving, if any, would then be split among the parties concerned, namely, the employees, the employer, and the building owner. The amount of the operatives' share would then be distributed in proportion to the total wages earned by each man on that particular job. This, in effect, would be equivalent to a dividend of so much in the pound on the total wages received.

This scheme is intended to provide:—

(a) That no interpretation of any "standard" is left to the contractor.

(b) That the operatives should be protected against abuses and maladministration.

For its adoption it is claimed:—

(i) That it would tend to lower building costs by making the client, and so the architect, define the work in detail in all particulars before that work began, so allowing for proper organisation;

(ii) That it would increase the use of proper bills of quantities.

In regard to (a), it will be seen that as the estimated number of man-hours is fixed before tenders are invited, the actual identity of the contractor would have no effect upon this figure.

The feature which should ensure the essential fairness of the result is that everything ranking for payment to the contractor is brought into its proper place in the calculations, thereby ensuring accuracy of measurement.

(In the matter of man-hour calculations all should be made in craftsmen man-hours, as, with the existing formula, labourers' rate equals 80 per cent. of craftsmen's rate; each "labourer" man-hour can thus be expressed as .8 of 1 "craftsman" man-hour.)

On consideration it will be seen that the only extra work involved on the part of the contractor is that of distributing the portions of the savings. This may be contrasted with the work involved in the application of the Payment by Results scheme under the Essential Work Order, where individual daily or even hourly measurement of output was required, and the separation of so-called "bonusable" and "non-bonusable" work had to be gone into in detail.

The inclusion of the building owner in the share-out is desirable in order (a) to

BRICKLAYER.

| *Item No.* | *Yds.* | *Ft.* | | | *Man-hour comp.* | *Total* | *Rate.* | £ s. d. |
|---|---|---|---|---|---|---|---|---|
| 140 | | 95 | Sup. | Reduced brickwork in Fletton bricks in cement mortar (1-3). | .35 | 33.25 | | |
| 141 | | 136 | „ | Do. do. (Provisional) .. | .35 | 47.6 | | |
| 142 | | 7,082 | „ | Half brick wall do. .. .. | .2 | 1416.4 | | |
| 143 | | 500 | „ | Do. do. (Provisional) .. | .2 | 100 | | |
| 144 | | 984 | „ | Do. do. in dwarf retaining wall (do.). | .22 | 216.48 | | |
| 145 | | 442 | „ | Do. do. in outer skin of cavity wall. | .22 | 97.24 | | |
| 146 | | 1,033 | „ | Do. do. in outer skin of cavity wall between concrete unit posts including all straight cutting and fitting to sides and head and pointing | .24 | 247.92 | | |
| 147 | 1,007 | — | „ | Extra on common brickwork for fair internal face and pointing with a neat flat joint as the work proceeds .. | .23 | 231.61 | | |
| 148 | 75 | — | „ | Do. do. (Provisional) .. | .23 | 17.3 | | |
| 149 | 546 | — | „ | Extra labour and material forming cavity 1½ in. wide between half brick and 2 in. hollow tile partition including galvanised wrot iron twisted wall ties built in every 18 in. in length and height and keeping cavity clean and free of mortar droppings .. .. .. | .9 | 491.4 | | |
| 150 | 130 | — | „ | Do. 3 in. cavity do. .. .. | .9 | 117 | | |
| | | | | | | 3016.2 | | |

pass on to the public the reduction in the cost of production, (b) to ensure that the building owner's interests are best served by whole-hearted co-operation, in achieving speed in operation and by prior discussion of detail.

It will also be appreciated that the so-called extra work involved in the calculation of total man-hours for the contract is in any case inevitable if a progress chart is made, and no phased labour programme can be produced without these data.

**Schedule.**

Attached is a specimen extracted from an imaginary bill of quantities; the figures used are not to be regarded as for any purpose other than illustrating method of procedure.

The two columns, "Man-Hour Component" and "Total" contain figures derived from a schedule to be fixed by an appropriate body. They would be lithographed with all the other data in the bills before issue to tenderers.

When the job is measured, the saving, if any, would be divided among the operatives, the employer, and the client, and in the case of the operatives would be paid as a "dividend" on the total wages paid to every man who had worked on the job.

It will be realised that the man-hour component is fixed by a standard schedule and included on the bills of quantities by the professional quantity surveyor, and does not lie within the jurisdiction or dispensation of the contractor.

If the tenderer does not feel that the man-hour component is an appropriate one he should cover himself (as he has always had to do) by pricing to allow for trade union rates to be paid for the time necessary for the job. If he considers the man-hour component too high, he may, if he feels so inclined, "cut" his rate column in the expectancy of his share of the saving.

# CORRESPONDENCE

*[Whilst we are glad to publish letters on professional and other matters of interest to our readers, it must be understood that we do not necessarily endorse the remarks of correspondents, who will oblige us if they will express their views as briefly as possible.]*

## A Backward Step by the L.C.C.?

TO THE EDITOR OF *The Builder*.

SIR,—Architects will be startled to hear that the L.C.C., in an attempt to build houses more quickly, is considering the transfer of the ultimate responsibility for housing work, at present under the direction of the County Architect and Town Planner, to the Valuer's Department.

Immediately on receiving this information, both the R.I.B.A. and the A.B.T., who have throughout worked together, wrote to the County Clerk asking that the Civil Defence and General Purposes Committee should receive a deputation, which was, however, refused. In addition, the national organiser of the A.B.T. referred to the matter at their conference on housing on Saturday last.

We believe it is absolutely contrary to the public interest that such an important matter should be discussed in conditions of secrecy. Had it not been for the publicity by the R.I.B.A. and the A.B.T. it would have been disposed of in equal secrecy. Now it seems that some pause has been given. It must be used to convince the members of the Council of the dangers of the proposal. We have already had indications that a number of them, irrespective of party, are shocked by it.

A Valuer's Department is competent to acquire sites, but not to decide where they should be. It is competent to handle the economics of housing, but not to design the houses or plan the neighbourhoods in which they are grouped. The A.B.T. is in a position to speak objectively on this matter, as its membership comprises surveyors as well as architects, and we record our firm opinion that to place the final direction of housing work of London with any department other than the Architect's Department will have disastrous results.

We believe it shows a weakening of the resolve to do the right thing quickly, a lack of faith in our ability not only to build houses but to plan a living environment. For, as Mr. Lewis Silkin, Minister of Town and Country Planning, said recently, "Town planning is not a fad or a luxury, it is a vital part of any national economy."

The Council's bold acceptance of the County of London Plan as the basis of their work led us to believe that they had turned their back on piecemeal development. The proposed divorce of housing from town planning gives rise to misgivings as to the Council's continued adherence to the plan.

Those in favour of the proposal point out that at present the L.C.C.'s housing work is divided between the Valuer, the Chief Engineer, and the Architect, and that in the interest of speed the various housing functions should be placed in the hands of a single chief officer. The argument for centralisation is reasonable enough, but why not centralise under the control of the architect, who is responsible for all other architectural work in London?

We saw, during the early years of the war, the consequences of responsibility for Government building work being divided between various Ministries—muddles, delays, waste of public money—and how these were largely overcome by more unified direction. The step the L.C.C. is now said to be contemplating ignores these lessons, and its logical development is the splitting up of the Architect's Department amongst the various departments for whom it now carries out work and the loss of valuable experience accumulated over a period of some fifty years. It will certainly cause unrest and dissatisfaction among the architectural staff, thus creating the worst possible conditions for tackling the work of housing and reconstruction; for it is on the men at the drawing-board and on the site that the speed of housing largely depends.

E. V. PENN,
General Secretary, Association of Building Technicians.
5, Ashley-place, S.W.1.

## Architectural Salaries.

TO THE EDITOR OF *The Builder*.

SIR,—At a recent meeting of the Architects' Registration Council of the United Kingdom a decision was reached to the effect that Local Government and other authorities be requested, in advertising architectural vacancies, to refrain from the discriminatory form of advertisement favouring Associates of the Royal Institute of British Architects.

In reply to a personal query, the R.I.B.A. have written: "Both Licentiates and Associates are regarded as fully qualified architects." It is difficult to understand, therefore, why discrimination continues, and yet, to my certain knowledge, one Local Government authority propose to restrict all posts of senior assistant and above to Associates of the R.I.B.A., with the consequent result that architects employed by that authority who are not Associates of the Institute are to be limited to a position and salary of very mediocre status.

This move will, no doubt, be noted and adopted by other Local Government authorities in the near future—unless it is officially and strongly emphasised to them that such discrimination is grossly unfair to the entire architectural profession and to the public in general.

Furthermore, this discrimination is not at all in accordance with the recommended scale of salaries recently published by the R.I.B.A., wherein it is stated that the salaries quoted are based on the recipient being entered upon the Register of the Architects' Registration Council. These scales cover salaries of £3,500 per annum downwards, without any specific mention other than, as previously stated, recipients must be Registered Architects.

It would appear, therefore, that such bodies as the County Architects' Society, etc., would do well to investigate this matter thoroughly, whilst the R.I.B.A. and the A.R.C.U.K. would be very well employed in utilising such authority as they possess to expound forcibly the principles for which they stand, in an endeavour to bring all authorities to a just basis on this matter of salaries and vacancies.

It might also help considerably if those Registered Architects who are not Associates of the R.I.B.A. would take a little concerted action in demanding their lawful rights of status. LANCASTRIAN.

## Building Costs.

TO THE EDITOR OF *The Builder*.

SIR,—I am not surprised that the author of the article on "Building Costs," which appeared in your issue for October 26, is afraid to put his name and address to such an effort, especially in a paper which is devoted to news of the building trade, and by that I mean building, as apart from speculative house building as was known by many, to their cost, prior to the outbreak of war in 1939.

May I be forgiven for smiling when reading, "The business initiative of this type of firm finds ways and means of countering the natural tendency of prices to rise in a period of unlimited demand."

Exactly! But not a word about how it is brought about.

I have seen, upon speculative housing estates, such examples of building construction as 2 in. by 2 in. firring, expanded metal and plaster as external walling in covering to projecting bays. I could quote other examples for hours on end of rubbish being foisted upon the public by people who have the impertinence to call themselves builders. This type usually sublets every possible trade to someone else, always at a profit to himself, and acts as a commission agent between the poor boob who buys the unfinished article and the inevitable building society. How amazing that he should be allowed to call himself a builder!

EDWARD W. CORDERY.

London, W.1.

## Builders and Local Government.

Among builders who have become councillors in the recent municipal elections are Mr. Leslie Wallis, former President of the National Federation of Building Trades Employers (Maidstone); Mr. W. E. Rice, former President of the London Master Builders' Association (Westminster); and Mr. J. Leslie Whitehead, a member of the Administrative Committee of the L.M.B.A. (Malden and Coombe). Alderman W. E. Mullen, President of the L.M.B.A. Central No. 3 Area, has been re-elected Mayor of Holborn.

# ASSOCIATION OF BUILDING TECHNICIANS

## CONFERENCE ON HOUSING

A CONFERENCE on Housing, organised by the Association of Building Technicians was held at the London School of Hygiene and Tropical Medicine, Keppel-st., W.C.1, on Saturday, November 3, Mr. Kenneth Campbell, President, occupying the chair.

THE CHAIRMAN, in opening the Conference, said that the object of the Conference was not to discuss national policy but to discuss the particular responsibility of the building technician himself in meeting the present crisis in housing.

### ADDRESS BY THE MINISTER OF HEALTH

In his address, the RT. HON. ANEURIN BEVAN, M.P. (Minister of Health), said that the Government had started off with certain disadvantages, disadvantages that were already revealing themselves in technical designs, and, in particular, in the relationship between the production engineer on the one hand and the architect on the other. He believed it was a great mistake to have started on a temporary housing programme. It had already had unfortunate consequences, and one of the most unfortunate of all the consequences was the fact that the type of temporary house which had been constructed had gravely injured the relationship of the public towards prefabrication. "If prefabrication is to succeed, if it is to satisfy our needs, we have to find a system of prefabrication so flexible, so 'fluid,' that the architect can co-operate with the production engineer.

"I believe that we shall find it, that before the middle of next year we shall have been able to discover and to put into production a system of prefabrication which will satisfy all modern scientific, factory requirements and which will be flexible enough for the architect to handle in almost as 'fluid' a fashion as bricks."

There were, of course, some systems of semi-prefabrication which were very useful, and which were proving much more successful than was at first thought probable, added the Minister. There was for example, one large city in this country which went to tender recently for traditional houses, and the tenders were so high that the Ministry had to reject them. "Tenders were obtained from some firms making prefabricated houses at very much lower figures, and those houses are now going up. I am waiting," said the Minister, "for the disciplinary consequences on the psychology of the local building contractors! Furthermore, some of these systems of semi-prefabrication are entitled to consideration in their own right; not merely because they compete successfully at present prices with traditional building, but because they are extremely interesting in themselves, if only because of the fact that they are of a kind that the small building contractor can handle, particularly the builder in rural areas."

Previous Governments had adopted too negative an attitude towards experimental design. A number of quite interesting experimental designs had been produced which the building Research Station and the Burt Committee "vetted" and pronounced upon, and some of them were proved to be satisfactory. Some he had mentioned in a recent Circular to local authorities. It seemed to him, however, that those systems which had been developed in isolation, all of which had great merits and all of which were quite satisfactory from the point of view of technical requirements, might, nevertheless, show greater possibilities if they were all examined together, and if the Government took a more positive share in examining them from the point of view of selecting one or two that might be suitable for universal application. He had therefore appointed a small working party, under the chairmanship of Professor J. D. Bernal. He (Professor Bernal) was looking at the systems. The most important part of his task was to see whether it was not possible to synthesise out of some of these systems of accepted production one or two systems on which the nation could put its money, and which would be flexible enough for the small building contractor in the rural areas to handle.

He (the Minister) believed that we had to try to make a revolutionary departure in housing. We had somehow to find a way of avoiding urban sprawl. We had to try to find some way of associating the amenities of the countryside with the amenities of urban life. One of the worst results of urban sprawl was the loss of first-class agricultural land, and the only way to get over it was to build vertically, to go up. It seemed to him that the arguments in favour of at least experimenting with high buildings in the countryside were overwhelming, and he was therefore going to try to persuade one or two of the great cities of this country to make themselves the foster-parents of an experimental scheme of clusters of high buildings with the countryside around them.

#### The Use of Architects.

Mr. Bevan continued: "You know that the Ministry of Health has always—not, perhaps, with sustained emphasis—placed a great deal of importance on the employment of the architect. In a few days I hope to be able to give further emphasis to that by the appointment of a very distinguished architect at the Ministry of Health. That is not to say that the architects whom we have had have not been distinguished; they have been. One of our difficulties has been to persuade local authorities to employ architects. We shall have to reinforce, both at the Ministry of Health and at the regional offices of the Ministry, our technical staffs, and ask the local authorities to co-operate with those technical staffs to a far greater extent than they have been inclined to do hitherto.

"I hope that we shall not have any frivolous thinking about this. There has been a tendency in some quarters that ought to know better to talk about the establishment of a National Housing Corporation. If we start toying with that idea, it will be a long time before we get our houses up, because once the local authorities get the impression that their housing powers are going to be exercised by somebody else they will stop building.

It may be necessary, and in fact it will be necessary, to find some instrument for building the new towns that are necessary to deal with overspill, and to do that by agencies other than the local authorities themselves; but I do hope that nothing will be said or done which helps to minimise the sense of responsibility of a local housing authority for getting on with the building of houses."

He had not yet been able, the Minister continued, to find, despite what he had said earlier, any system of construction which could compete with brick if we could get the output that we should like to get, nor was there any reason for the building worker to fear that the invasion of the building industry by other systems of construction would have the effect of jeopardising his future. But he believed that the building industry was going to be able to do its job in the building of traditional houses only if the building contractor was going to do the job that he could best do, and not make himself half into a merchant and half into a building contractor. "We shall have to try to organise, therefore, the mass production and distribution of housing materials in such fashion as to enable him to do the job that he ought to be doing, which is that of co-ordinating the actual work of building houses on the site."

On the question of housing standards, he was determined that for the 3-bedroom house there should be no lower standard anywhere in Great Britain than 900 superficial feet, and that was a minimum.

A vote of thanks was proposed by Professor Sir Charles Reilly and carried with acclamation.

### AN A.B.T. STATEMENT

A statement on behalf of the A.B.T. was made by MR. COLIN PENN (National Organiser), who said that the Association now had to put into action the theories which they had discussed before and to see how they could push ahead with the actual construction of the dwellings which were so badly needed. He would give a brief outline of what the Association thought were the responsibilities of technicians. First, they welcome the decision of the Government to attack the problems of the lower-income groups first and to rely on local authorities as the main agents for carrying out the building that would be needed. The record of the local authorities could be criticised in many respects, but it compared very favourably with the record of private enterprise. It was the deliberate policy of the Government for most of the period between the two wars to encourage private enterprise and to see that local authorities did not build the greater number of the houses that were erected; but on grounds of appearance, planning, cheapness and low rent the local authority houses scored. "Many of us work for local authorities, and therefore have a big personal responsibility to see that they do their work as well as it can possibly be done. We must put forth all our energies and not succumb to the rather deadly atmosphere which I know hangs round a good many local authority offices. We should like local authority jobs to be considered desirable, and for people to compete for them, instead of their being looked on, as they sometimes are, as the last resort of the man who cannot get a job anywhere else. We want local authorities and Government departments to have the pick of the country's building technicians, because we believe that that is where they can be best used. In order that these jobs may become desirable, it is going to be necessary to improve conditions very considerably. We believe that working conditions are not all that they should be, and that pay is not all that it should be. Again, properly-trained men must be allowed to take responsibility for the work that they do, and must not be subjected to often arbitrary interference by people who know less about the technical side of the job than they do. Next, we should like to end the rivalry that exists between engineers, surveyors, architects and other building technicians. This rivalry is not to the good of the building industry as a whole, and we think that, except in the smallest local authorities, there should be separate engineering, surveying and architectural departments, each under a man qualified in his particular field, and each of equal and independent status.

"It is true that it is the architect who suffers most from the non-observance of this principle, and for this reason we are greatly alarmed by reports that we have heard in the last few days that in our greatest local authority, the London County Council, the building of houses is to be removed from the control of the architect's department and put into the Valuer's department. This seems to us a retrograde step, and I am sure that all architects, and I hope all building technicians, will resist it. To hand over the ultimate control of house building to a non-technical department will, in our opinion, be disastrous."

Coming to national authorities, he

would not speak of the Ministry of Health, because he felt that the audience had a good idea now of what that Ministry stood for; but he would like to deal with the Ministry of Works. The bitterest criticism of that Ministry came from the people who worked there. We knew that very much of this criticism was justified, but did we also think of what we could do personally, and, more particularly, collectively, to eliminate some of the things about which we grumbled so much? "I do not feel satisfied," said Mr. Penn, "knowing as I do many people who work in that Ministry, that they are doing all that could be done in this way."

It had to be said, however, that the Ministry of Works had very positive achievements to its credit during the war. It has done its utmost to bring about a new scientific approach to the question of building, and, as a result of the many reports and standards which it had issued, the industry had a basis for ending at last the haphazard and rule-of-thumb methods which had held back the building industry for the last twenty years or so. British Governments had probably always under-estimated science, except during the war. The Association would like to see increased grants to the Building Research Station, to enable them to widen very considerably the scope of their work. One felt that too much of their work was of a somewhat negative character, in that it consisted of testing things that were put before them. The Association would like to see some more positive research, which would result in new developments; and with increased allocation to them, he thought that that was possible.

Mr. Bevan had referred (continued Mr. Penn) to the question of traditional construction and prefabrication. The Association believed that for many years yet both methods would continue to be used side by side. It was the job of the technician to show how the efficiency of brick building could be increased, because at present it was not very efficient. In spite of the fact that it showed up so well, if the processes were studied one would find that there were many inefficiencies. We had to develop standardisation and mass production of components, so as to get higher standards more cheaply. It was not the Association's job to support one system against the other; we had to see that both worked as efficiently as possible.

With regard to the demobilisation of building technicians, one heard that they were coming back rapidly, but the Association would like to see still further speeding up, particularly of students and teachers. The demobilisation of teachers was proceeding very slowly indeed, and, if we did not release more students he was afraid we should find that there was a sudden drying up of the supply of young people in a few years' time, just when our building programme was at its height.

In conclusion, Mr. Penn said: "We, the technicians, have the skill and the training, and I think we should demand that they be properly used."

## A DISCUSSION

A discussion on neighbourhood and site planning, the planning of dwellings, the organisation of building works, etc., was opened by MR. THOMAS SHARP, President of the Town Planning Institute. There was a very great danger that planning principles might be neglected. Going about the country, he said, there was beyond any doubt a very definite tendency in most places to concentrate on the building of large bulk housing estates. He thought that that was a mistaken view if it meant, as it often did, the neglect of building on smaller sites. It was a matter of degree. Big cities were bound to need big housing areas to replace their slums and to meet the new housing programme, but he did not think

PROFESSOR J. D. BERNAL, Chairman of the Scientific Advisory Committee of the Ministry of Works, whose address to A.B.T. Conference begins on page 400.

that that applied to smaller places. Unless we were careful we should have a continuation of that urban sprawl about which the Minister spoke. We should keep our towns as compact as possible, having regard to all the requirements of health and so on.

"There is a further and a very real danger in the large housing estate. I refer to the building of large one-class communities. I know that that is something which it is very difficult to avoid. No-one would advocate the indiscriminate mixing of all types of house. The way to provide for a varied community is to arrange for minor groups of dwellings within the neighbourhood, each with its own character, and evidence from social workers suggests that minor groups should contain from 100 to, say, 300 families."

MR. FREDERICK GIBBERD said that whether we liked it or not, the biggest factor in design would be machine production. Handicraft methods were bound to be superseded by machine methods. Our problem was to humanise the machine. The art of architecture was becoming very similar to the art of industrial design, but much more complex. Proper function and efficient construction were not enough; they could both be arrived at by a process of reasoning, but a work of art in the last resort was not created by an intellectual process but by an emotional one. "The great mistake made in the past, which must not be made again, was to believe that architecture was simply what happened after function and construction. It happens *through* them."

In the last housing phase, architects designed only a small part of housing. "The tendency to-day, both in Government departments and in private enterprise, is to create larger and larger organisations, simply because they are more efficient in quantity production. But the creation of a work of art is a personal thing, and individual struggle between man and his material. No work of art has ever come out of a committee. A method must be found by which individuals can work in large organisations with reasonable freedom and without being swamped by the size of those organisations."

MR. ARTHUR LING, referring to the problem of creating the right conditions for free expression and creative work amongst architects in local authorities, said that what was wrong was the existence of too steep a pyramid in the organisation; designs which had started at the bottom had to go through so many hands that when they emerged at the top they were completely unrecognisable. It was necessary to have small groups, and to introduce the freedom of the private architect's office into the office of the large local authority. Much could be done to speed up output in the architects' departments of large local authorities by simplifying the organisation.

MISS J. M. ALBERY, dealing with prefabrication, said that a self-contained system for a house, generally patented, was both monotonous and uneconomic; real progress was to be found in the design of separate parts, which should be interchangeable not only with other prefabricated parts, but also with more traditional types of construction.

MR. WALTER SEGAL said that Le Corbusier would have been glad to hear what Mr. Bevan said about flats in the open country, because that was something which he had always advocated. Personally, he looked on the flat as a bungalow at various levels. If the qualities of the bungalow were fully used in flat planning, the flat would be a far more satisfactory type of dwelling than it had been in the past. The problem was mainly one of access, and much of the past criticism of flats had really been directed against access.

MR. J. C. MOLLOY said that at present 16 steps were necessary to get a plan approved and a housing scheme started. The Manchester Branch of the A.B.T. would like to see a Ministry of Housing set up with a regional organisation and representatives of the different Ministries concerned all housed in one building, so that a plan could be dealt with in one building in the region primarily affected.

MRS. ANNE SIMON emphasised the need to make provision for the married woman who wished to work outside the home, not by the installing of more gadgets in the kitchen, but by some form of communal living. Many more people, she contended would want the advantages of communal living once they were available, and the others were already catered for.

MR. H. T. BURKE criticised Mr. Bevan's suggestion that the building contractor should not have to concern himself with the supply of materials, and said there had been ample evidence during the war of the mess that Ministries had made when they had attempted to deal with the supply of building materials to a contract. There was no evidence that a cheap price could be obtained for large orders. Building contractors had long experience in getting their materials, and could speed up delivery by withholding payment until they got them.

MR. JOHN W. LISTER referred to the disparity between wages and salaries and the present high building costs, and said that the Government had not done enough to control the cost of building materials. High tenders by contractors, he suggested, were due to the fact that there was no national standard of quantities for building work, such as should exist throughout the country for all local authority houses. At present tenders for the same type of house varied between £1,200 in one part of the country and £800 in another. It was not enough to tell local authorities that tenders were too high, because that held up housing; steps must be taken to see that they were brought down to the right figure.

## EXPERIMENTAL BUILDING

At the second session a discussion on methods of construction, experimental building research, etc., was introduced by MR. D. E. E. GIBSON, Coventry City Architect, who, opening the discussion, said: The main part of my talk this evening follows a talk which I gave some time ago about some experimental work which we have been doing in our city on house building. We in the city of Coventry knew a few years ago that there was going to be this great trouble about housing, and we happened to be fortunately placed by having a useful staff of people who have had some technical and special knowledge in various branches of building, and by being in a centre where we have some rather special industries near to us—aircraft, motor-car, and so on—which are of an experimental turn of mind and work in readily with a local authority such as ours in carrying out ideas. It was for those reasons that we tried out new techniques of planning and construction and building. I shall go through the different parts of the house on which we are working and tell you why we decided to do certain things, which parts were good and which were bad, and why.

First, the frame of the house. We decided to see how far it was possible to reduce the labour hours of the normal building type for the erection of housing, and we decided that one essential was to have a frame to carry the structure. In selecting the material for that frame, we decided that metal was the best material for our purpose, because it can

be used to span large areas and so it is possible to reduce foundation troubles to a minimum.

We designed a frame which was rather like a grid with four point foundations, one at each corner of the house. The frame makes it possible to work on several parts of the house at the same time; it is possible to put up floors and roofs and instal plumbing without waiting until the whole structure is built. We decided to use a tubular form of metal. Once you seal the ends of a tube you have protected one surface against corrosion, so that you can expect a greater length of life. Moreover, it is a material the production of which has been greatly increased for war-time purposes and which is likely to have not so great a demand in peace, so that there should be some production to spare, which in the case of some sheet metals there may not be, because of the demand for motor-cars and so on.

### Floors.

With regard to floors, we decided that with this new frame we could eliminate the needs to strip the turf and clear and level the site; we have only to level the four foundations at the corners and stand the house on them, leaving the grass growing elsewhere and providing little concrete screens, hung from the house, to stop children and dogs and so on from getting underneath. To prevent dry rot it was obviously impossible to have timber immediately above that, so that for the ground floor we have a concrete floor of precast reinforced units, which complies with the by-laws.

The weight and size of our floor slabs varied until we found that 3 ft. by 2 ft. by 1½ in. slabs were ones which the men could handle easily. They are laid quite dry on to the tubular frame, with a strip of asbestos blanket as a sound insulation between the steel floor joists, which span from one side of the house to the other. Upstairs various types of floor can be used, but we found, although we have used a timber type of floor there, that a concrete one has proved to be cheaper. Various floor surfaces can be used—wood block, asphalt, linoleum and so on—and in an emergency you can let the people live in the house for a few years with just a few rugs on the concrete floor.

For the roof, the objects were to provide a cheap roof as a watershed with satisfactory heat insulation. We finally used a Trafford asbestos sheet at a 10 deg. pitch, with a similar material for the eaves and fascias in moulded lengths, so that there is no painting or maintenance to be done on the eaves and soffits. That has worked very well. We lay a glass wool blanket on the tops of the ceiling, which is where we want to conserve the heat; there is no point in warming up the roof space. We have tried other materials, such as insulating board with thin metal veneers stuck on in the factory, and they work satisfactorily, but we find that the cheapest satisfactory roof is the asbestos one which we have used.

### Wall Construction.

The walls are made of three parts: (i) The outside, only taking care of the weather, the water and damp; (ii) the frame itself, carrying the whole house and the loads of the floors; and (iii) the heat insulation on the inside, as a lining. I am certain that that is the most satisfactory way to do it. You can try to incorporate the two in one skin, but if you get any penetration through into your heat insulation then, in most of the materials that I know at any rate, the value of your heat insulation drops straight away to about half.

We have on the outside a precast concrete block. We started off with units about 8 ft. high and 3 ft. wide. The trouble with those was partly weight in handling, but more particularly the damage caused in loading and unloading, the chipping off of a corner ruining the whole slab. Finally, we came to a 3 ft. by 1 ft. 4 in. slab, which is easy to handle and fix, and is very little subject to damage.

We have divided the wall itself into two parts in height. We thought there might be a good deal of rough usage on the lower part of the house, and that we must have something solid there, but that up above the first-floor windows a lighter material could be used. We, therefore, tried an asbestos fretted sheet with a textured surface, and down below these concrete units. The inner lining, where the heat insulation is, is a plaster board with a light timber frame with a woodwool packing; but we have found out, on going into our costs, that it would be done better by framing up the whole inner wall with a frame in light timber and attaching the plaster board on the site rather than in the factory.

For the staircase we tried out a light metal tube with little strips welded on to carry the floor treads, and left the rises open, except for a rail to stop children going through. It is easy to dust and provides a convenient floor with hardwood treads and no need for carpeting. It works well and looks satisfactory, but we can build a timber staircase a good deal more cheaply. We did not think before we started that that would be so, but we found that it was.

We tried out different types of metal skirtings and mouldings where the ceiling joins the walls, and tried some simple and rather nice shapes in aluminium; but there, again, we found that, though they worked very well, a timber skirting and timber moulds of that type are cheaper, and are quicker and easier to fix.

### A New System of Plumbing.

We tried a new system of plumbing, a one-pipe-one-stack system where you take all the pipes from all the fittings directly into the soil and vent stack without any anti-siphon system at all. By getting your pipes the right sizes and getting the falls rather slight, you can be sure that the pipes do not get completely full of water and that you do not get the anti-siphonage which draws the seals under the fittings, and you save a great deal of metal in doing it. It is against the by-laws, but we worked with the Building Research Station, and the subsequent tests by the Building Research Station for the Ministry of Health have proved very satisfactory. It is one of the systems recommended in *Post-War Building Studies*. That is a section of the work which has been very successful. We have installed the plumbing inside the house, away from the danger of freezing. We run the heat services in the same duct, and the whole duct acts as a very low temperature radiator for the whole house. We have also kept our feed tank under the ceiling, and I see no reason why one should ever put it up above. It is easily accessible, and there is enough pressure for the upstairs wash-basin and bath, and there is less risk of freezing up.

We have experimented with the heating services also, and have tried to produce all the heat and hot-water from one fire in the living-room. In this case it is a stove which goes night and day in the winter, with a back boiler and a warm convection pocket round the stove itself. Ticking over as it does, you can get a larger volume of hot water than with something which goes out every night. We have low-temperature background heating in two bedrooms and the entrance hall, and arrangements in the kitchen for drying dish-towels and a warm towel rail in the bathroom. It all works very well, and you cannot burn a great deal of fuel, because there is only this one appliance. In summer there is either a gas circulator or an electric immersion heater, to get hot water for baths and washing up.

For electric wiring we tried out, and it has been very successful, Power Tenax, an oxychloride-filled, very narrow small copper conduit in exact lengths for each circuit between two points, with the ends already bare for connecting up. We have cavities where we want them to run the wiring, and the work can be done very quickly.

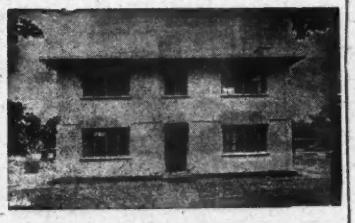
### Some Conclusions on the House.

The conclusions with regard to our house are these: As a house it seems perfectly satisfactory, with no feeling of shoddiness. It seems a good place to live in. The thermal insulation is better than it would be in the ordinary building that we have had. That is important in a house in which you are trying to design your fuel-burning appliances carefully. We find that we can provide this type of central heating in a house of this type at about the same cost as traditional building, which is important. We find, incidentally, that the cost of fireplaces, mantelpieces, hearths, fenders, the brick chimney breasts and so on which one normally has in a house, with the flashings and chimney-pots, is about £87, and you save that, and can put in instead things which are more useful than open fireplaces.

We have cut out the air grate that one normally finds in bedrooms, and that one so often finds stopped up. We take our fresh air in through the hall, up the staircase and along the landing, through an air grate over the door of the bedroom, and out up the flue in the room itself. There is a radiator which ensures that the air as it comes in is slightly warmed.

We have found from our costing that the job has to be done in a big way to get the costs down. The type of organisation to handle the job must be rather a big one; it is not something which can be taken on in the ordinary small office, but requires a special organisation to go into production in a proper way. Things such as tolerances come into it in detailing. The ordinary way in which we architects detail a drawing, with so many feet and inches up to a partition and then on again, leaving the width of the partition, does not work out when you get the units from factories and put them together; you find at the end you have too much or too little space, and so a new technique is involved.

In conclusion, Mr. Gibson said: I believe that building is developing in a new

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sort of way. I think that many of these experiments which are being carried out now are going to show improvements in performance in housing, and I think that many of them will find their way into traditional building; but I am rather worried because I think that we architects are not, by and large, technically equipped to know which things are really good and which, perhaps, are not so good. The Building Research Station has done some wonderful work, but some of that work has not been made use of. The work on smoky flues, for instance, was not put into effect, and architects continued to do faulty things, though the information was available. It is no use having a Building Research Station, however good, if the work is not going to be put into effect. I think that the A.B.T. can do something here.

What I should like to see is this: With the new people who are coming along the difficulty is not so great, because their training can be arranged on a scientific basis, but for the others I should like to see a tremendous expansion in the service given by the Building Research Station to the people whom it serves. I should like to see hostels and lecture-rooms provided, and local authorities and private firms given grants to enable large numbers of members of their staffs to go there for, say, a period of a month each year. In the case of a local authority such as my own it would not be essential for everybody to go, but the department should have one or two people who are technically competent in this sort of way. I should like them to go there for a month or two a year, and for the local authority to be able to send them without worrying about finance and salaries, which would mean some sort of Government scheme for reimbursement.

I should also like to see some interchange basis so that architects would be able to go abroad for periods to work, without losing their superannuation rights and so on. I want to see local authority architects, private architects and Government architects working together on a more common basis. When, for instance, I left the Civil Service to go into local government, the superannuation scheme of the one could not be carried over to the other. I should like to see all this married together to the utmost extent, and, if that is done, we shall have something which will play a great part in fitting us to do our job really well.

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## THE ORGANISATION OF BUILDING

### PROFESSOR BERNAL'S VIEWS.

PROFESSOR J. D. BERNAL, F.R.S., Chairman of the Scientific Advisory Committee of the Ministry of Works, who continued the discussion, said: What I am going to talk about is not so much scientific research in building as its organisation. I am not qualified to talk about scientific research in building; the people who have been doing that research are the people at the Building Research Station. When I was asked to advise the Ministry of Works, it was more on the question of organising the scientific research and widening its scope. I think that I can best start by giving you a brief outline of our programme, and then you will see what an enormous job science has to do and how much of it has still to be done.

The first thing to do was to plot out the field, and we did so in a very rough way by dividing it into three big divisions: Requirements, Material and Structures, and Construction. We have had a good deal of talk about the first to-day, this question, with which the Minister of Health is very concerned, of seeing that we get adequate and increased standards. But these standards cannot be fixed arbitrarily; in the long run, they will have to be fixed by research, and by very practical research. That is one of the things that we hope to do.

We hope to have, and we are already building, enough experimental houses—with experimental tenants!—to find out certain things that we want to know. The tenants themselves will have to be carefully selected for ordinariness, but they will be asked to carry out and have facilities for carrying out certain very simple and very practical measurements on their houses and the suitability of those houses. The houses will be of a great number of diffrent types. The whole experiment is being designed to make the fullest use of modern statistical methods.

We also have the work in the laboratory, and in what may be called the studio stage, where we can have whole rooms, and even whole houses, which can be studied under accurately controlled conditions; and at the Building Research Station we hope to build up that as rapidly as possible.

#### Human Requirements in Planning.

It is what we may call a new job of domestic engineering. It is astonishing, coming to it from outside—and in these matters I am a complete amateur—to find out how little is known about all the things which are supposed to be laid down. For instance, the greatest authorities on ventilation have practically stated that they have not the slightest idea what ventilation is, how much you require, whether it does any harm whether you have it or not, what is fresh air, and so forth. There are complete mysteries. If you adopt laws and regulations and so forth, you are just following a kind of mumbo-jumbo which may, unfortunately, be legal at a particular time, but for which we have to find the basis; because we do not want to design the house round the by-laws, we want to design the by-laws round the habits and requirements of human beings.

That, then, is the first division, and it covers much more than the ordinary requirements of architecture; it covers habits of life, fittings, kitchen equipment, cupboards, and ultimately the things that go into the cupboards; we hope to co-ordinate with the new scientific work which has been started in the Board of Trade to see that the things which are produced for the home fit the home, and, *vice versa*, that the home fits the things that have to go into it, so that our cupboards are the right depth and height, and that things are not made which will not fit into the cupboards when they could easily and equally functionally fit into them. That is the practical requirements side.

Then we have our materials and structures side, which is more straight building science. Most of the work which has already been done has been done in that section, but there is still an enormous amount to be done there. We have now really broken up the functions of the structure of a house into the insulating functions and the load-bearing functions. We have frames for load-bearing, and we have to consider the design of the frames. Professor Baker, at Cambridge, has a big team of people who are going into the question of real structural design, and again, as in the case of ventilation, it is surprising to find how little is known about the elementary mechanics, elasticity, stiffness and so on, and permissible strength of frames. I am sure that, as a result of that work, we shall be able to get great improvements in design and a reduction of those things that are known to the engineer as factors of safety, and which are, in fact, factors of ignorance. We are not doing this for æsthetic purposes, but because every single thing that we can find out about the strength of structures will mean economies in construction, and will mean in practice more houses in a given time.

We are doing the same thing with the insulating and weather-proofing materials, both in and out of the house. We want not only to examine the properties of existing materials but to develop new materials, and to do this having regard to all the factors involved, and not only the properties of the materials. We know materials with admirable properties, and possibly one day we shall use them, but at the moment they are very expensive, and, therefore, for the time being they are out. We know that we have a very restricted number of practical materials which are there and are cheap enough, but we want to use them in the best way.

#### Experiments in Cladding.

Take a simple example, material for external cladding. I have seen in the course of the last three weeks no fewer than 10 different forms of concrete cladding. About half of them are roughly the same, but some of them are very notably different, and if they do the things that they should do they will be very much better than the ordinary ones. We have to get down to designing the practical, easily made, easily handled and lightest possible external cladding block. There is no point nowadays, if you are going to have a house with a frame, or even a house without a frame, in adding unnecessary weight. The ordinary house, which weighs anything from 80 to 100 tons, is altogether excessive in weight. All that material has to be carted a long way and put up on the site, and anything that we can do in design or choice of materials to reduce that weight is all to the good, provided that we do not lose anything on other factors; we always have to keep that in mind. We do not want to make things so finicky that what we gain on weight we lose on labour.

The practical development of these materials is one of our first priorities—to use the existing materials, to look into the light concretes, for instance, to look into hollow bricks of various sorts, cladding materials and internal finishing materials, to select the best and drive forward to practical production; to consider the processes of production of the material, the kiln and factory processes, just as much as the use of the material on the site, and to weld those two together.

Finally, and perhaps most important of all, we have the construction or building industry section, and there also we are making an attempt to consider the matter in its widest aspects, and to consider first

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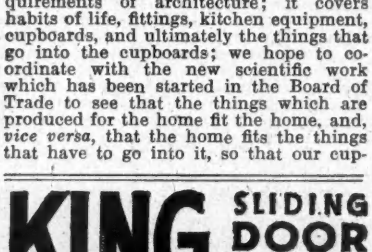

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of all the essential element in building, the building worker. We want to see that the houses that are going to be built are going to be built in the first place by the present workers in the building industry and in the second place by new labour which comes into the building industry. We want to make the fullest use of the existing experience and the existing skills of bricklayers and plasterers, and add to them improvements in new varieties of skill and improvements in the same skill.

**Improved Bricklaying Methods.**

One of the very interesting things being done at the Building Research Station today is the study of improved methods of bricklaying; and with the use of what is not so very modern equipment in principle, though apparently relatively new in the building industry such, for instance, as jack rising scaffolding, it seems possible to improve the efficiency of ordinary bricklaying, in terms of bricks per man per day, by a factor of 60 per cent. That is a modest estimate; I think that in fact we shall get up to 100 per cent. We can do this effectively, however, only if we get the co-operation of the building workers and their unions. If we do not bring them in, and do not bring in adequate safeguards so far as wages and conditions and general prospects of employment are concerned, we shall not get anywhere. But we are trying to do all that scientifically, by bodies of people who have been doing very similar things in the war, in the Services and in the manufacture of war materials; we are trying to adapt modern production methods to actual building operations on the site.

Besides that, we have to consider the other aids to building, building machinery. There has been very little effective developmental work on building machinery. We have all the existing building machinery, such as mixers, hoists, cranes and so forth, and the new machinery for foundation building, and a whole host of things which can be tackled as one definite problem, the development of building machinery. Closely allied with that is the development of related machinery, such as road-making machinery and factory equipment. That is one of the tasks on the building industry side.

All that put together may be called the tactics of building, but besides that there is the strategy of building, the whole question of the organisation of building. It is my conviction, from looking at all the evidence that I have seen on sites and on paper, that the greatest economies of all should be got out of site organisation. There, I think, we may get into some difficulties with our architectural and æsthetic friends, because there seems to be no doubt that it is going to be more difficult in general to have effective site organisation in building when we are dealing with a large number of different kinds of house, each being built in small numbers. We shall have to have some minimum. I think we shall have to come to an agreement there to produce a number of houses that will not look too ugly by small variations, and then make big variations at greater distances.

Together with that question of the organisation of building there are the wider questions of the finance of building and the provision of building materials. We must attempt to get a scientific answer to one of the questions raised in this Conference—namely, what is the real economics (not the paper economics) of the purchase and distribution of building materials, how far the building merchant is carrying out a useful function and how far his work can be co-ordinated, what does the bulk order mean and where it should be used.

I think there is no doubt that very different conditions apply to different fittings. There are certain fittings which can be made quite efficiently in small quantities in a large number of small factories, and there, perhaps, bulk orders will be of almost no value. Continuity of orders will be useful, but not bulk orders. On the other hand, there are some of these new fittings, and in particular some of the plumbing units, which can be made efficiently in four or five large factories at considerable distances throughout the country, and those factories can be built and tooled up for the job only if there are bulk orders; it is not possible to depend on casual orders for work on that scale.

It is questions of those kinds that we are trying to tackle. It is a combined effort of scientists, involving not only the technical scientists—the physicists, the chemists, the engineers—but also the social scientists and the economists. In that way, and through these committees, we are trying to make progress. It may be nothing beautiful has ever come out of a committee, but I hope that something useful will come out of it. These bodies are not just talking committees; they are operative committees, because they have on them the people who are concerned with getting the work of the committees done.

**Staff and Equipment Shortage.**

I do not conceal from you that the problem is going to be a very difficult one in practice, for reasons which have been brought out over and over again at this Conference, and which will have to be dealt with at a very high level—shortage of staff and equipment. We shall have to extend our building science organisation by a very large factor and very quickly. I have great hopes, however, of the actual man-power that we have in architecture, engineering and science today. I think that it is only a matter of persuading the Civil Service to grant decent conditions of pay and promotion, and then we shall be able to find the people and set them to work. But I think that we shall have to push very hard to do that, and that is why I welcome this opportunity of addressing you, because I hope that we shall be able to get a great deal of outside work done as well as laboratory work, and in that the co-operation of the building technicians is particularly important.

**The Experimental Building Programme.**

I have in mind, for instance, our experimental building programme. We are proposing in the Ministry of Works—in fact, in one case it happened before the appointment of the Scientific Advisory Committee—in connection with some of these prefabricated house designs to build in the first place several hundred houses; in fact, getting on for a thousand houses, and probably rising to two or three thousand, for experimental purposes. It is a double experiment. They are experimental in the sense that they will be put up under controlled conditions, very carefully time-studied and costed in detail, and then, when they are up, the same houses are going to be experimented with by being lived in. Half of them are normal, traditional houses; the other half are various varieties of semi-prefabricated and fully prefabricated houses. There will be enough of each kind to enable fairly careful tests to be done.

They will be divided roughly into three grades. Some houses will be let in the ordinary way to tenants provided by local authorities in the ordinary way, the only difference being that we shall ask some very elementary questions, such as the amount of coal used, various questions about damp and various general questions relating to the convenience of the house. No form-filling will be involved, because we shall be able to provide the people to collect the information in the way I am about to mention. Then there will be another and smaller group of, say, 10 houses on each site which will be more fully experimental, and which will have experimental tenants—that is to say, people who will agree to rather more elaborate measurements, to the installation of a certain amount of simple measuring equipment in the house, particularly of heat, and who will furnish information weekly or monthly. Finally, on each site we hope to be able to have a resident experimental officer, who will actually live in one of the houses and who will carry out considerably more elaborate measurements in his own house, and who will be responsible for collecting the information from the other houses on the site. I think that, luckily for us, with the present shortage of houses, we may not find it too difficult to find our resident experimental officers, but they will have to have fairly high qualifications, because they will have to make scientific measurements.

That is the kind of thing that we can do in the Ministry; but for every one house that we can examine in this way there are hundreds up and down the country which can also be examined. Every single building site can be a source of experimental information. We do not want to miss any information, and we want to get not only the information but all the ideas that arise out of this building programme. It is bound to happen—and this will apply particularly to the new types of building—that all kinds of ideas will crop up in the course of erection. We have already heard from Mr. Gibson how many things have been changed in the relatively short period for which the Coventry house has been put up. We do not want to lose those changes; we want to pick up every idea, and continually to pull those ideas together. One person may have an idea on one kind of house, and it may not work on that kind of house, but the idea itself may be immediately applicable to some entirely different type of house, with which that particular man is not acquainted. If we can pool all this information together in the Ministry and then put it out again to the people concerned, we shall be getting somewhere.

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**Prefabrication Problems.**

I should like to say something in particular about prefabricated houses, because, as the Minister of Health admitted, he threw on to me at very short notice this terrible task, which has baffled all architects for years, and which it is certain will get me down also, of studying every kind of the 1,300 varieties of prefabricated house which have been put forward, deciding which seem the best, and pulling all the ideas together. When you come to do that, you do find that science is of some little value. For instance, if instead of prefabricated houses we were dealing with insects, we should find that ordinary people, looking at insects, would say "There are an awful lot of them; you cannot make sense out of them." In the course of time, however, scientists have found classificatory methods of dealing with something like 20,000,000 species of insects, so that a mere 1,300 prefabricated houses is a comparatively simple business!

When you try to make that classification, you find that they do classify comparatively simply on a number of relatively independent features. You can separate the classification of main structure, wall structure, from that of floors and roofs and foundations. You can go still further, and this is perhaps the most important distinction, and classify by construction. Essentially the same type of house, with the same materials and the same type of frame, can be put up by putting up the frame first and then fixing the cladding on to it, or can be made in prefabricated panels, including the frame, and put up and cladded afterwards, or the panels may be cladded either on one side or on both in the factory. That, of course, does not exhaust the varieties, because when you put them up you can put them up in small pieces which can be handled, or in larger pieces which can be handled by two men or a light crane, or in whole wall slabs handled by a heavy crane or a gantry.

When you consider all those varieties, you can see that what has actually happened is that the artist or designer—"artist" in the more general sense, as a person who has ideas which a committee finds it more difficult to generate!—faced with the problem of constructing a house, has arrived at a solution. Every single variety of prefabricated house, at any rate if it has got to the prototype stage, is a solution of the housing problem; but the man or the group or the firm who put forward that solution have undoubtedly done better in certain parts of their ideas than in others. They have made the whole thing—plan, structure, cladding and everything else—and it is because they are particular solutions that not one of them can be the best solution. There must be combinations of some of the things which will give better solutions.

**No Ideal Prefabricated House.**

When you come to consider what is the best solution, immediately you realise that you are not working, as it were, in a technical vacuum. It is fairly easy—at least it is not as complicated as the next problem—to find a structurally and scientifically satisfactory solution—*i.e.*, to find a solution of a house which will stand up and keep warm and comfortable, and which will last. The problem really becomes complicated when you have to consider the external conditions with which it also has to comply—the limitations in the sources of material, the limitations of the kind of labour, the time involved in getting the drawings out, the state of knowledge on various parts of the thing, and, finally, considerations of having to sell the house to the Ministry or to the local authority. All those are additional factors which have to be fully taken into account.

The result of that is, of course, that you will never have an ideal prefabricated house. You will probably have a variety—and a sufficient variety, I hope, to please the architects—of prefabricated houses, but those varieties will belong to one class, the class of best solutions in their own field. The ideal of a classification, for instance in a dog show, is not to provide the ideal dog, but to provide a gold medal for the best Airedale or Greyhound, or whatever it may be. We hope to produce something like that—a set of what we might call Mark I prefabricated houses, which will be the best we can do at the time. If I were to ask any of you here, you would say, "Give us three or five years, and we will show you something," but, of course, housing will be going on five years hence, and we are not going to say, because we need houses now, and have to work with the Mark Is, that we will not go on with the others. We shall try to do with housing exactly what we did with weapons of war. We had to have a tank at once, even though we knew that it was a pretty poor tank, but we were always working on Mark II and Mark III while Mark I was out. I think that the Spitfires got up to Mark XXV by the end of the war.

That kind of organised progressing of work is one of the things at which we shall aim. We shall try to get these questions of plan, of structure, and of construction of prefabricated houses separated from each other and reduced to groups which are satisfactory, not for the whole country, but for certain conditions and certain localities. As the Minister said, some of them may be more suited for rural districts, to be put up in small quantities, while others may be suited for very large housing estates.

My last word will be on the general question of what all this science really means. Talking to you as an amateur in building science, I feel all the time that what I am really saying is what you should be, and in many cases have been, saying yourselves. The only difference between doing a thing scientifically and doing it technically is in the organisation and in the measurement; it is in bringing all these things together, in reducing them to some common standard, and then, from that common standard, going back to the technician and into practice.

After discussion, THE CHAIRMAN summed up the Conference, which then closed.

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# THE VICTORY (EX-SERVICES) CLUB

## LUNCHEON DISCUSSION.

THE part that firms and individuals associated with the building industry can play in the establishment of the Victory (Ex-Services) Club was discussed at a luncheon at the Dorchester Hotel on Thursday, November 8. Sir George Burt presided, supported by Field-Marshal Lord Chetwode, President of the £1,000,000 Victory (Ex-Services) Club Fund, and the Marquis of Carisbrooke, Chairman of the Fund, and others.

Field-Marshal Lord Chetwode said that the project now known as the Victory Ex-Services Club began with the foundation by Mr. James A. Malcolm (present at the luncheon) and the late Major Haggard, of the Veterans' Association, which established a club for ex-Servicemen, later known in memory of its President as the Allenby Services Club. Here old Servicemen could obtain food, drink and a bed at prices they could afford. Better still, they found the comradeship that had meant so much to them in the Forces. The Allenby Club was the only place in London that catered in this way exclusively for ex-Servicemen. But it was no longer suited to the purpose for which it was founded. It was small, its position, in Holborn, was out of the way, and it was dilapidated as a result of having been bombed three times. Therefore the Victory (Ex-Services) Club Fund hoped to replace the Allenby Club with a modern building in the heart of London, where, in addition to facilities for ex-Servicemen, it would be possible to provide a wing for ex-Servicewomen and to invite ex-members of the Allied Forces. The Fund had the full support of the heads of Services, of the Prime Minister, and of Government departments.

Mr. George Gibson said that the General Council of the Trades Union Congress had agreed to the re-establishment in the Metropolitan area of the Penny-a-week Fund in aid of the appeal. Many unions had contributed to the Victory Club appeal, and he hoped that all would do so.

Mr. George Tomlinson, Minister of Works, said he regarded the proposal for the Victory (Ex-Services) Club as an invaluable cause. "So long as I am regarded as the foster-father of the building industry," he added, "I want to see that it realises its duty in this respect."

Speaking as Chairman of the Appeal Publicity Committee, Mr. Cyril J. Ross mentioned that an anonymous member of the industry had defrayed the cost of the luncheon as a means of assisting the appeal. Another member had suggested to him that the industry, as its own offering, might make itself responsible for the actual erection of the club buildings. Appeal committees had been formed in a number of industries and trades, the textile industry having set itself a target of £200,000 and the furnishing trade of £100,000. In addition, there had been individual gifts ranging from £100 to £5,000. So far, the appeal had met with the warmest support in some 20 industries.

Sir George Burt, as chairman of appeal in the building industry, said the Club would help us to repay the great debt owed to the Forces.

Guests at the luncheon included: Sir Dudley Pryke, Sir Henry Holloway, Sir Jonah Walker-Smith, Sir John Mactaggart, and Messrs. R. Coppock, Percy Thomas, R. H. Francis, R. R. Costain, G. W. Buchanan, and J. S. Galbraith.

# IN PARLIAMENT

### R.A.F. Architects.

In reply to questions by LT.-COL. WALKER-SMITH, MR. STRACHEY (Under-Secretary for Air) said on May 1 the total figures for the airfield construction trades in the Air Force were 433 officers and 16,685 airmen; on October 1 they were 430 and 15,662. Of course the majority were building tradesmen. R.A.F. requirements which were almost all overseas were constantly under review. He was also examining the possibility of those few men who were at home helping with other work of national importance.

### Repairs to Football Grounds.

SIR P. HANNON asked the Minister of Works what representations he had received on the necessity of repairs to football grounds which suffered damage during enemy raids and at which spectators were exposed to the inclemency of the weather; and if reconstruction facilities would be permitted in such cases.

MR. TOMLINSON said he had received a number of applications, supported in some cases by representations from local interests, for licences to carry out repairs to football grounds. In so far as work of this type could proceed without interference with housing and other priority work, it had been, and would be, permitted. His general policy would be to restore facilities for the general body of spectators rather than to provide additional comfort for a limited number.

### Brickworks.

MR. S. DAVIES asked the Minister of Works how many licences had been granted for the reopening of brickworks closed down during the war; how many had been reopened and resumed production; and was he satisfied with the progress made in bringing this vital industry into full operation.

MR. TOMLINSON said that licences to reopen had been granted in 214 cases, and at the end of September bricks were actually in production in 20 of these works. Labour was not returning to the brickworks as quickly as he could wish, but everything that was possible is being done with the assistance of the Minister of Labour. Meantime, the stocks of bricks in hand provided a reasonable safeguard against any general shortage for some months to come.

Replying to MR. P. FREEMAN, MR. TOMLINSON said that the number of closed brickworks was 753; when working to full capacity they would employ 20,000 persons. Stocks of bricks held by brickmakers totalled 1,100,000,000. Provided always that the necessary labour was forthcoming, he did not anticipate a shortage of bricks for housing or other essential purposes.

### Prefabricated Houses.

MR. STUDHOLME asked the Minister of Works what were the agency fees charged by his Ministry for each type of prefabricated house; and why such fees were charged.

MR. TOMLINSON said that all expenses incurred by the Ministry of Works in providing and erecting temporary houses were chargeable to the Temporary Housing Account. The work included the preparation of drawings, specifications and quantities, the ordering of supplies, the placing of contracts, the supervision of works, and the settlement of accounts. It was not possible to apportion these expenses to each type of house individually, but it was provisionally estimated that they would amount overall to about 2 per cent. of the total cost of the programme.

MR. BOSSOM asked the Minister of Works whether he had already placed orders for all of the 158,480 prefabricated houses, together with all their component parts, as listed in his White Paper, Cmd. 6686, on Temporary Housing.

MR. TOMLINSON said the reply was in the negative. The number of temporary house hulls ordered was 128,830, but negotiations were in train with the manufacturers for the extension of the existing orders to cover the further number required. Except for small balances, orders had been placed for all component parts required for the hulls that had been ordered.

MR. BOSSOM asked the Minister of Works if he would break down the cost of the Uni-Seco house mentioned in the White Paper on the temporary housing programme under the following headings: Site preparation, payment to contractors for hull, kitchen-bathroom unit, erection and installation on site, any other charges, Ministry of Works administration and overheads, giving the original estimates which made the total cost in January £772 and the revised estimates given in the White Paper to total £1,020.

MR. TOMLINSON: No, sir. Orders for a large number of temporary houses, and their fixtures and fittings, have still to be placed, and many tenders for site preparation and house erection have yet to be invited. It would therefore not be in the public interest to publish details of the estimated cost of any one type of temporary house. It may be assumed, however, that the superstructure or hull represents only about one-third of the cost, and that the components and services provided by the Ministry of Works account for the remainder.

MR. BRADDOCK asked the Minister of Works what moneys had been paid by the Government in connection with the temporary housing programme to the companies producing each of the following houses: Arcon, Uni-Seco, Tarran, Spooner, Universal, Phœnix, and the aluminium house.

MR. WILSON, who replied, said that the amounts paid up to October 31 were approximately: Arcon, £1,750,000; Uni-Seco, £2,431,000; Tarran, £608,000; Spooner, £79,000; Universal, £55,000; Phœnix, £1,211,000; aluminium, £663,000.

### Use of War Prisoners.

MR. BUTCHER asked the Minister of Works what was the total number of German prisoners of war at his disposal and also the number of German prisoners which he had been unable to supply in response to requests from local authorities and statutory undertakings.

MR. TOMLINSON said that there were at present 27,700 German prisoners of war at his disposal. The number of prisoners which could not at the moment be supplied to local authorities and statutory undertakings was 18,634, of which 4,208 were required for work directly in connection with housing.

### Private Enterprise.

MR. BOSSOM asked the Minister of Health if the allowance of £1,200 in the country or £1,300 in London, for houses to be built by private builders, included the cost of the land and servicing.

MR. BEVAN said it did.


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# COST OF BUILDING

## NATIONAL FEDERATION WOULD WELCOME INQUIRY.

BUILDERS were only too willing to co-operate with the Minister of Health to bring down prices, said Mr. G. W. Buchanan, President of the National Federation of Building Trades Employers. He was speaking at a special general meeting of the North-Western Federation in Manchester last Tuesday afternoon. Mr. H. Bardsley, President of the North Western Federation, presided. They would like an analysis of building costs to be made public, and would welcome any inquiries into the matter which the Minister might decide to make. He would very quickly find that there were no building rings.

Critics of the present prices of houses really must distinguish between high prices and unreasonable prices, said Mr. Buchanan, and they should make sure of the full facts before attacking builders. "High prices are inevitable while costs remain high, but unreasonable prices cannot be justified. Builders regard such prices as not only contrary to the public interests, but also to their own interests. A big majority of the prices submitted by builders to local authorities have been approved by the Minister of Health himself as reasonable; on occasion the Minister had found it necessary to prune the specifications of local authorities.

"There may, I fear, be unemployment in the building industry next year unless the production of materials and equipment is speeded up. I therefore ask the Government to release more quickly men in the Forces who are required for the manufacture of materials such as bricks and light castings and equipment, such as baths and cooking stoves. It is no good having the men to erect houses if the material is not available in the right quantities, in the right places and at the right times.

"Although the conditions of the release of Class B men have been improved, they are still not coming out quickly enough. One way of making the Class B Scheme less unattractive, without departing from the fundamental principles of the Demobilisation Scheme, would be to make release subject only to the condition that the men obtained employment with a builder engaged on the building of new houses. The men could then do what they wanted to do—choose their town and select their employer. And one volunteer in the building industry, as elsewhere, is equal to three pressed men."

### Demobilisation.

MR. EDWARD G. BUSH, a director of Concrete, Ltd. (Bison Floors), has now been demobilised, and has taken up his duties with the firm again. Mr. Bush has been serving as a major in the Royal Engineers.

### Change of Address.

MESSRS. LISTER, HOLMES & CO., surveyors and valuers, have had to vacate their offices at 7, Park-lane, W.1, and are now practising from 14, Clarges-street, Mayfair, London, W.1 (tel. : Grosvenor 1020 and 1811).

# THE SCOTTISH BUILDER

## NEW BUILDINGS

**Glasgow.**—Plans prepared for alterations and additions for Kapper, Ltd., at Fieldon and Barrowfield streets, for which the architect is A. Victor Wilson, 9, Calder-st., Motherwell.

**Glasgow.**—The Corporation to erect dining centre at Purdon-st., for which the architect is John MacNab, 129, Bath-st., Glasgow.—Alterations and additions to be carried out for John Buchanan and Bros., Ltd., for which the architects are William Baillie and Son, 4, West Regent-st., Glasgow.

# FUTURE CONSTRUCTION

## CONTRACTS OPEN

For some contracts still open, but not included in this list, see previous issues. Those with an asterisk are advertised in this number. The dates at the heads of paragraphs are those for the submission of tenders; a dagger (†) denotes closing date for applications; the name and address at the end refer to the person from whom particulars may be obtained.

### BUILDING

**NOVEMBER 21.**

†**Adlington U.D.C.**—30 houses at Four Acre Farm and 20 at Fair View. Bradshaw Gass and Hepe (FF.), 19, Silverwell-st., Bolton. Dep. £1 1s. Tenders by December 7.

***Harrow U.D.C.**—72 houses at Rayners-la. estate. H. W. Rackham, F.S.I., S., Council Offices, Uxbridge-rd., Stanmore. Dep. £3 3s.

†**Worthing T.C.**—25 houses at Meadow-rd. Applications in writing to B.E. Dep. £2 2s.

**NOVEMBER 23.**

†***East Suffolk C.C.**—(a) Erection of two M.O.W. huts with brick wall panels for kitchen and dining room with small service room at Lowestoft Secondary School; (b) taking down existing playshed. E. J. Symcox (F.), County A., County Hall, Ipswich. Dep. £2 2s. Tenders by December 17.

**Ludlow R.D.C.**—8 Swedish houses. J. B. Cooper (F.), 177, Corporation-st., Birmingham, 4. Dep. £2 2s.

†***West Ham C.B.**—32 dwellings at Devonshire, Garvary and Churchill-rds. Thomas E. North, Boro. A. and Planning Officer, 100, West Ham-la., E.15. Dep. £2 2s.

**NOVEMBER 24.**

†***Bexley B.C.**—28 flats. G. A. Joy, F.S.I., B.E. and S. Dep. £3 3s.

**Llandilo U.D.C.**—30 houses in 4 groups. W. S. P. Cottrell, 8, Quay-st., Carmarthen. Dep. £2 2s.

†***Ministry of Works.**—Foundation work to be commenced in December, 1945, for House of Commons rebuilding. Apply in writing to Director of Contracts (Con. 2), Ministry of Works, Abell House, John Islip-st., S.W.1.

**NOVEMBER 26.**

**Aberdare U.D.C.**—50 houses at Penywaun. E. and S., Vestry Hall, Aberdare. Dep. £3 3s.

**Abingdon R.D.C.**—4 bungalows at Steventon estate. Architect, Council Offices. Dep. £2 2s.

**Ashton-in-Makerfield U.D.C.**—230 houses at Rectory-rd. S. Dep. £2 2s.

**Berkhamstead U.D.C.**—20 houses at Swing Gate-la. E. E. Hulse, (L.), E. and S. Dep. £2 2s.

**Leeds T.C.**—Adaptation of Block 4, St. James's Hospital (North) into Maternity Isolation Unit and Infirm Wards. Superintendent of Works and Buildings, 125, Beckett-st., Leeds, 9. Dep. £2 2s.

**Ryde (I. of W.) T.C.**—6 pairs of houses at Harding-rd. E. S. Sheppard, T.C. Dep. £2 2s.

**Seisdon R.D.C.**—50 houses on 3 sites. F. Bagley, A.M.Inst.C.E., Council Office, Wombourn. Dep. £2 2s.

**Wymondham U.D.C.**—8 houses at Silfield estate and 4 at Suton. R. O. Bond, Architect, Mountergate, Norwich. Dep. £1.

**NOVEMBER 27 (Amended Date).**

**Llanfyllin R.D.C.**—12 houses on 2 sites. R. A. Jones, Architect, "Bwthyn-Hedd," Llanfyllin. Dep. £2 2s.

**NOVEMBER 27.**

**Carlton U.D.C.**—42 houses at Burlington-rd. E. and S., Council House. Dep. £2 2s.

***Chepping Wycombe (High Wycombe) T.C.**—82 houses at Hatters Farm estate. J. A. Parkinson, M.A., A.M.Inst.C.E., B.E. and S. Dep. £2 2s.

***Frome U.D.C.**—37 houses on 3 sites. B. H. Parkes, S., 22, Christchurch-st., West. Dep. £3 3s.

**Gt. Yarmouth C.B.**—70 houses at North Denes estate. B.E.

**Maldon R.D.C.**—16 houses on 3 sites. S., Council Offices, Wantz-rd., Maldon, Essex. Dep. £2 2s.

†***Button and Cheam T.C.**—17 houses at Caldbeck-ave. and Browning-ave., Worcester Park. N. H. Michell, M.Inst. C.E., B.E. and S. Dep. £3 3s. Tenders by January 7.

**NOVEMBER 28.**

**Newcastle Emlyn R.D.C.**—22 houses in 4 groups on selected sites. W. S. P. Cottrell, Architect, 8,Quay-st., Carmarthen. Dep. £2 2s.

**Stockton-on-Tees B.C.**—100 houses at Darlington-la. Boro. A., 124, High-st. Dep. £2 2s.

**NOVEMBER 30.**

**Oswestry R.D.C.**—8 Swedish houses. S. and E. Dep. £2 2s.

**DECEMBER 1.**

***Ventnor U.D.C.**—10 pairs of houses on 2 sites. G. Poole, A.M.Inst.C.E., S., Salisbury-gdns. Dep. £2 2s.

**Wombwell U.D.C.**—60 houses at Summer-la. Housing S. Dep. £2 2s.

**DECEMBER 3.**

**Conway T.C.**—18 houses and road sewers works at Plas Newydd estate. B.E. Dep. £2 2s.

***Godalming T.C.**—10 bungalows at Silo Wood estate, Farncombe. B.E. and S. Dep. £1 1s.

***Esher U.D.C.**—8 cottages off Covents-rd., Claygate. E. and S. Dep. £2 2s.

**Montgomeryshire E.C.**—Canteen kitchen and dining room at Welshpool County School. T. Glyn Davies, D. of E., County Offices, Newtown. Dep. £2 2s.

***Norwich T.C.**—42 flats at Heigham-st. City A., City Hall. Dep. £1.

**DECEMBER 5.**

**Sunderland C.B.**—186 houses (Contract No. 4) Springwell Farm estate. B.E. Dep. £2 2s.

**DECEMBER 7.**

**Droitwich T.C.**—50 houses at Stalls Farm estate. G. L. Robinson, B.E., 105, Friar-st. Dep. £2 2s.

**DECEMBER 10.**

**Gosport T.C.**—150 houses at Bridgemary site. Applications in writing to B.E. and S. Dep. £5 5s.

**DECEMBER 15.**

***Redditch U.D.C.**—74 houses at Salters-la., Batchley estate. A. W. Loveday, F.I.A.A. (Loveday, Smith and Perrins), 10, Unicorn Hill, Redditch. Dep. £5.

**DECEMBER 17.**

***Croydon C.B.**—(1) 42 houses, Long Heath; (2) 32 houses, The Glade; (3) 180 houses in 4 sections, Ashburton estate. B.E. Dep. £3 3s.

**Oakengates U.D.C.**—60 houses on 3 sites. M. S. Lee, M.Inst.M.& Cy.E., Council Offices. Dep. £2 2s.

**NO DATE.**

**Fleetwood T.C.**—Erection of houses at Homestead estate. B.E. and S. Dep. £3 3s.

**St. Andrews T.C.**—Applications invited for work in various trades for 100 houses at Lamond-dr. J. C. Cantley, T.C.

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### MISCELLANEOUS

**NOVEMBER 24.**

**Liverpool T.C.**—Demobilisation of brick and concrete surface shelters. City E. and S.

**NOVEMBER 26.**

**Scunthorpe T.C.**—Demolition of shelters and static water basins. B.E. and S. Dep. £1 1s.

**NOVEMBER 28.**

**Lincoln T.C.**—Demolition and clearance of 207 shelters. City E. and S. Dep. £2.

**Sale T.C.**—Demolition and removal of 21 brick and concrete surface shelters. B.S.

**NOVEMBER 29.**

**Swanage U.D.C.**—Removal of defence works. S.

**DECEMBER 11.**

**Bolsover U.D.C.**—Demolition of shelters. S.

**NO DATE.**

**Durham C.C.**—Demolition and removal of shelters and reinstatement of sites. County S., 43, Old Elvet, Durham.

### ENGINEERING

**DECEMBER 14.**

**Eire Electricity Supply Board.**—Civil construction work of hydro-electric development of River Eire, Co. Donegal. P. J. Dempsey, Secretary, 60-62, Upper Mount-st., Dublin. Dep. £21.

### PAINTING, ELECTRIC LIGHTING, MATERIALS, ETC.

**NOVEMBER 29.**

**Liverpool T.C.**—Internal painting at Quarry Bank High School. City E. and S.

### ROADS, SEWERAGE AND WATER WORKS

**NOVEMBER 26.**

**Darwen T.C.**—Construction of cemetery at Balton-rd. B.E. Dep. £2 2s.

**Ely U.D.C.**—Roads and sewers. A. E. King, Architect, Council Offices. Dep. £1 1s.

**Wembley T.C.**—Making-up Chaplin-rd. (part). Boro. Treas. Dep. £1 1s.

**NOVEMBER 27.**

**Llangelly R.D.C.**—Roads and sewers at various sites. Architect and S., 12, Station-rd. Dep. £5 5s.

**NOVEMBER 28.**

**Barrow-in-Furness C.B.**—Roads and sewers, Ormsgill site. B.E. and S.

**Godalming T.C.**—Laying 250 yds. of 4-in. internal dia. spun-iron water mains, etc. C. B. Spivey, M.Inst.M.& Cy.E., Water E., 35, Bridge-st. Dep. £2 2s.

**Merton and Morden U.D.C.**—Roads and sewers and ditch culverting. E. Dep. £3 3s.

**Pontypool U.D.C.**—Roads and sewers, Kemys Fawr estate. F. R. Bates and Son (F.), Tredegar-chbrs., 78, Bridge-st., Newport, Mon. Dep. £5 5s.

**NOVEMBER 30.**

**Oadby U.D.C.**—Roads and sewers, Wigston-rd. Pick, Everard, Keay and Gimson, architects and surveyors, 6, Millstone-la., Leicester. Dep. £2 2s.

**DECEMBER 3.**

**Oldham C.B.**—Roads and sewers on 5 sites. B.E. and S. Dep. £2 2s.

**DECEMBER 7.**

**Droitwich T.C.**—Provision and laying of approx. 2,860 yds. lin. of concrete flag paving at Stalls Farm estate. B.E., 105, Friar-st.

**DECEMBER 12.**

**Macclesfield T.C.**—Construction of main intercepting sewer. Willcox, Raikes and Marshall, 33, Gt. Charles-st., Birmingham, 3. Dep. £10 10s.

**Rugeley U.D.C.**—Construction of 10,000 lin. yds. of sewers, with manholes, pumping station rising main, disposal works, etc. A. Evans, C. Dep. £3 3s.

### PUBLIC APPOINTMENTS

*Full details of Public Appointments marked * are advertised elsewhere in this issue. Those marked † have been advertised in previous issues.*

**NOVEMBER 21.**

**Perth and Kinross C.C.** — Architectural Assistant.

**NOVEMBER 25.**

***Coventry T.C.**—(1) 2 Senior Assistant Architects; (2) 1 Chief Quantity Surveyor; (3) 1 Senior Assistant Architect; (4) 1 Assistant Architect; (5) 1 Junior Architectural Assistant; (6) Temporary Assistant Quantity Surveyors and Surveyors' Assistants.

**NOVEMBER 26.**

***Bath T.C.**—Two Architectural Assistants, Grade 3.

**NOVEMBER 27.**

***Cardiff E.C.**—Temporary Assistant Lecturer in Architecture.

***Deal T.C.**—Architectural Assistant.

***Fulham B.C.** — Temporary Architectural Assistants.

***Walton and Weybridge U.D.C.**—Clerk of Works.

***Wolverhampton C.B.**—Building Inspectors.

**NOVEMBER 29.**

***Wolverhampton B.C.**—(1) Senior Architectural Assistant, Class 1; (2) Senior Architectural Assistants, Class 2; (3) General Architectural Assistants.

**NOVEMBER 30.**

†**Hayes and Harlingham U.D.C.**—(a) Senior Town Planning Assistant, (b) Quantity Surveying Assistant, (c) Architectural Assistant, (d) Town Planning Assistant.

***Leicester T.C.**—Clerk of Works.

***West Cornwall Joint Planning Committee.**—Planning Assistant.

**DECEMBER 1.**

***Dorset C.C.**—Engineering Assistant.

†**South Shields C.B.**—(a) Chief Assistant, Town Planning; (b) Senior Engineering Assistant; (c) Architectural Assistant; (d) Junior Architectural Assistant; (e) Assistant Building Inspector.

**DECEMBER 3.**

***East Ham C.B.**—(1) Architectural Assistants; (2) 2 Technical Assistants (District Officers).

†**Edmonton T.C.** — Temporary Engineering Assistant.

***Newport (Mon.) C.B.**—Deputy Boro. Architect.

***Stoke-on-Trent T.C.**—Reconstruction Officer.

***Widnes T.C.**—Building Inspector.

**DECEMBER 4.**

†**Breconshire Joint Planning Committee.**—Technical Assistant.

†**Gateshead T.C.**—Junior Assistant Quantity Surveyor.

**DECEMBER 6.**

†**Liverpool T.C.**—Superintendent of School Buildings.

**DECEMBER 7.**

***Islington B.C.** — Temporary Architectural Assistant.

**DECEMBER 8.**

***Croydon C.B.**—First Architectural Assistant.

***Worcester T.C.**—General Clerk of Works.

**DECEMBER 10.**

***Kirkcaldy T.C.**—Assistant Architects.

**JANUARY 15.**

***Somerset C.C.**—County Planning Officer.

**NO DATE.**

***Middlesex E.C.**—Full-time Teacher of Technical Drawing and Building Construction.

***Overseas Employment.**—Inspector of Works Gold Coast P.W.D.

## GENERAL BUILDING WORK

**Abram.**—U.D.C. appointed J. C. Prestwich & Sons (F.), architects, Bradshawgate-chbrs., Leigh, to prepare plans for housing scheme.

**Bedworth.**—Warwickshire E.C. propose school on housing site.

**Bacup.**—T.C. to prepare plans for Health Centre and Clinic Hospital near Old Corn Mill.

**Bakewell.**—Derbyshire E.C. propose modern school.

**Billesden.**—Sherriff & Co., Ltd., Ireton-rd., Leicester, propose 1,275 houses at Spencefield-la. area.

**Bingley.**—Catholic authorities propose school at Cottingley.

**Birkenhead.**—T.C. approved sites for school dining-rooms and kitchens.—Catholic authorities propose secondary school for girls.—E.C. propose dining-room accommodation at Woodlands and St. Annes R.C. schools.

**Bolton.**—E.C. propose dining centre at Shepherd-st., for Oxford-grove school.

**Bradford.**—Catholic authorities propose 4 secondary schools and playing fields, at £320,000.

**Brighouse.**—T.C. approved demolition of public-house and erection of hotel at Wakefield-rd., Lightcliffe, for R. Whitaker & Co., Ltd., Corporation-st., Halifax.

**Bromsgrove.**—Ansell's Brewery Co., Ltd., Birmingham, propose erection of "Cofton Arms" hotel, Cofton Common. Plans by Batemans (FF.), 19, Bennetts Hill, Birmingham, 2.

**Cheadle.**—H. T. Goodwin, White Lodge, Blythe Bridge, proposes development of site at Blythe Bridge for housing estate.

**Cumberland.**—C.C. approved improvements at Cumberland and Westmorland Mental Hospital at Garlands at £90,500. Plans by J. Haughan, County Architect, 4, Alfred-st. North, Carlisle.

**Darlaston.**—Rubery Owen Housing Association, Ltd., acquired 352 acres off Walsall-Wolverhampton-rd., for development as Bentley Garden Village estate.

**Haslingden.**—Lancs E.C. propose central kitchen at Warner-st.

**Lancaster.**—Bay Manufacturing Co., Ltd., Morecambe and Heysham, propose works at Bolton-le-Sands.

**Leigh.**—T.C. propose Health Clinic and library at Butts Bridge.

**Liverpool.**—E.C. propose alterations and additions at Childwall Valley high school.

**Liverpool.**—E.C. propose dining-room and kitchen at Calder High school for Girls, also combined kitchen and dining-room at Sudley-rd. County school.

**Manchester.**—Associated British Cinemas, Ltd., acquired Prince's Theatre site for erection of cinema with restaurant and shops. Plans by W. R. Glen, architect to the company.

**Manchester.**—T.C. approved: Additions to works at Bradnor-rd., Northenden, for C. H. Johnson & Sons, Ltd., J. H. Sellers, 78, King-st., Aintree; additions to works at Tram-st. and North-st., Openshaw, for Cooke & Ferguson, Ltd.

**Newcastle-under-Lyme.**—Managers of St. Patrick's R.C. school propose secondary school at New Ashfields.—T.C. propose residential flats, and also houses at Wolstanton-rd., and Hollows Farm, Chesterton.

**Pontefract.**—E. G. Crofts, Market-pl., Pontefract, is architect for 160 houses at Chequerfield site, for T.C.

**Rochdale.**—E.C. approved sites for 9 dining centres at schools.

**Rotherham.**—E.C. propose extensions at Technical College.

**Sale.**—Directors of Warwick Cinema acquired site for repertory theatre.

**Salford.**—Hardy's Crown Brewery Co., Ltd., Renshaw-st., Hulme, propose rebuilding "Albert" inn, 184, Regent-rd.; B. Lang & Co., Ltd., propose reconstruction of Fortuna Works, Gordon-st., Broughton.

**Sheffield.**—Richards Bros., & Sons, Ltd., propose factory at Moore-st. and Fitzwilliam-st.

**Southport.**—Church of England Central Board of Finance, Church House, London, S.W.1, acquired Scarisbrick Hall and grounds for conversion into teachers' training college.

**Stockport.**—T.C. approved:—Extensions to works at Carrington Field-st., off Higher Hillgate, for Murray & Ramsden, Ltd.; A. Rush, Ltd., Progress Works, Hempshaw Brook, propose works at Bell-st., Hempshaw-la.—E.C. propose schools at Whitehill estate and Nangreave-rd.

**Stretford.**—T.C. approved "Happy Man" hotel, Barton-rd., for Hardy's Crown Brewery Co., Ltd., Renshaw-st., Hulme.—Lock & Co., Ltd., Lostock-rd., Davyhulme, propose 113 houses at Barton-rd.

**Stretford.**—T.C. approved: Rebuilding extentions at W.M. Club, Ashburton-rd., for Trafford Park Working Men's Club Trustees.—E.C. propose dining-hall at Ayres-rd., for Seymour Park school.

**Tottington.**—U.D.C. propose 130 houses at Green Farm and Lower Walshaw Farm.

**Upholland.**—U.D.C. approved motor body building works, Sambrook-rd., for J. Cross, 1, Sunny-dr., Orrell.

**Urmston.**—Lancashire E.C. propose dining-room and kitchen at grammar school.

**Wallasey.**—T.C. appointed H. J. Rowse (F.), Martin's Bank-chams., Water-st., Liverpool, as architect for housing scheme at Mersey-st. site.—E.C. propose kitchen and dining-room for Moreton junior mixed and infants' school.—Catholic authorities propose school at Rake-la.

**Warrington.** — Health Committee propose maternity block and accommodation for staff at General Hospital, at £67,500.

## TENDERS

* Denotes *accepted*.
† Denotes *provisionally accepted*.
‡ Denotes *recommended for acceptance*.
§ Denotes *accepted subject to modification*.
¶ Denotes *accepted by H.M. Government departments*.

**Bacup.**—Four classrooms additions at Bacup and Rawtenstall Grammar school, for Lancashire E.C. G. Noel Hill (F.), County A., County Offices, Fishergate-hill, Preston: *E. Taylor & Co., Ltd., Ebor Saw Mills, Littleborough, nr. Rochdale, £2,321.

**Barnsley.**—Conversion of Old Rectory, Church-st., into classrooms and erection of three huts, for E.C.: *Vernon Dunk, Ltd., Barnsley, £4,447.

**Belper.**—10 houses at Belper-la., for U.D.C. A. P. Taylor, architect, 59, Chapel-st.: *Wheeldon Bros., The Clusters, Belper, £10,276.

**Birkenhead.**—Construction of roads and sewers at Woodchurch estate, for T.C.: *Mears Bros. (Contractors), Ltd., Bromborough Port, Bebington, Ches, £154,631.

**Blyth.**—28 houses, for T.C.: *Direct labour.

**Bootle.**—Works for T.C. W. A. Harrison, B.E. Rebuilding 11 houses: *Public Works Section, Bootle Corporation Town Hall, Bootle, £10,781.

**Bradford.**—Central kitchen, for E.C.: *E. W. Moulson, 64, Fair-rd., Wibsey, Bradford, Yorks.

**Brandon.**—20 houses at New Brancepeth, for U.D.C. F. Hedley, architect: *Direct labour, £17,000.

**Carlisle.**—Seven houses and two flats at Croft-rd. estate, for T.C. P. Dalton (A.), City E. & A.: *John Laing & Son, Ltd., Dalston-rd., Carlisle.

**Doncaster.**—26 houses at Rossington, for R.D.C.: *W. Finch, Ltd., Doncaster, £29,715.

**Droitwich.**—20 houses at Station-rd., for R.D.C.: *Wheeler & Mansell, Lime-st., Evesham, £25,039 (subject to M.H. approval).

**Guildford.**—70 houses, for T.C.: *W. H. Gaze & Sons, Ltd., Kingston-upon-Thames, £93,297 (subject to M.H. approval).

**Guildford.**—34 cottages, for R.D.C. E. & S.: *A. Grover, 36, Farnham-rd., Guildford (two houses, Ripley); *W. King & Sons, Hogs Back, Seale (six, Seale); *C. Neal & Sons, West Horsley (6 Send); *B. Butcher, Shalford (6 Shalford and six Effingham); *Godalming Building Co., Farncombe, Godalming (8 Hurtmore).

**Halesowen.**—30 houses at Fatherless Bara estate, Cradley, and 20 at Highfield-la. estate, Halesowen, for T.C.: *J. M. Tate & Son, Ltd., Cradley, £33,040 and £22,709.

**Kidsgrove.**—(a) 30 houses; and (b) 32 houses at Talke Pits site, for U.D.C. Wood, Goldstraw & Yorath (A.), Station-rd., Tunstall, Stoke-on-Trent: *(a) Sambrook Bros., Hamil-rd., Burslem, Stoke-on-Trent, £35,541; *(b) H. Grant & Son, Hickman-st., Newcastle-under-Lyme, £33,341.

**Liverpool.**—Works for T.C. L. H. Keay, City A. Reinstatement of Central library, William Brown-st.: *H. Boot & Son, Ltd., Church-st., Litherland 13, £1,267; extensions at Eagle & Child Electricity Substation: *Bragg & Collins, 54-60, Chatham-st., £4,175; interior painting, Police Training school, Mather-av., Smithdown-rd., Hospital and Belmont-rd. Emergency Hospital: *W. H. Snow, Ltd., 59, Belmont-rd., £3,975.

**Llanelly.**—18 houses, for R.D.C.: *Isaac Jones & Sons, Llanelly.

¶**London (Air Ministry).**—List of contracts to value of £500 or over for week-ended November 10:—*General maintenance work*: Fred. Pearson & Co., Ltd., Doncaster; Sheriff & Co. (1943), Ltd., Leicester; J. H. Pierce, Chirnside, Duns, Berwickshire; G. & J. Seddon, Ltd., Little Hulton, nr. Bolton, Lancs. *External concreting work*: Grounds & Newton, Ltd., Bournemouth. *Miscellaneous structural steelwork*: G. M. Carter (Erectors), Ltd., Newcastle-on-Tyne, 2. *Building work*: Brazier & Son, Ltd., Southampton. *Miscellaneous heating and hot water installation*: F. G. Alden, Ltd., Oxford; Babcock & Wilcox, Ltd., London, E.C.4.

**London (M.O.W.).**—Contracts placed by M.O.W. during week-ending November 8:—*London*: Bethnal Green, Seco houses, A. T. Rowley (London), Ltd., Cambridge Works, Lordship-la., Tottenham. *Argyll*: Lockgilphead, dining-room and kitchen, Jas. Carmichael, Argyll-sq., Inverasay, Argyll. *Essex*: Dagenham, Seco houses, Dove Bros., Ltd., Cloudesley-pl., Islington, London, N.1. *Hampshire*: Portsmouth, Seco houses, Frank J. Privett, Ltd., 10, Devonshire-ave., Portsmouth. *Kent*: Ramsgate, school kitchen, H. Goodsell, 23, Watlingst., Canterbury. *Lanarkshire*: Glasgow, siteworks and Tarran houses, Thomas McBurnie & Co., Ltd., 133, Milngavie-rd., Hillfoot, Glasgow; Walter Guthrie & Co., Ltd., 10, Vernon-st., Glasgow.

**London (War Dept.).**—Works contracts placed by War Dept. for week-ended November 3:—*Surrey*: Miscellaneous work, the Leatherhead Building Co., Leatherhead. *Hampshire*: Painting work, Jones & Son, London, W.8.

**Market Drayton.**—34 houses at Christ Church site, for U.D.C. J. Brian Cooper (F.), Coleridge-chbrs., 177, Corporation-st., Birmingham 4; *J. A. Harvey, Market Drayton, £37,408 (subject to M.O.H. approval).

**Pendlebury.**—Works canteen at Newtown Mill, Lees-st., for J. Ashworth (1902), Ltd., 75, Whitworth-st., Manchester 1. T. E. Smith & Son, architects, Fold-chbrs., Bolton: *E. Tonge & Son, Ltd., 36, Station-rd., Swinton, Manchester.

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